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HEARINGS

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BEFORE THE

U.S. Congress. House.

COMMITTEE ON IRRIGATION OF ARID LANDS

OF THE

HOUSE OF REPRESENTATIVES,

RELATING TO

THE RECLAMATION OF THE ARID LANDS
OF THE UNITED STATES.

JANUARY 28 TO FEBRUARY 9, 1901.

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RECLAMATION OF THE ARID LANDS.

COMMITTEE ON IRRIGATION OF ARID LANDS,
HOUSE OF REPRESENTATIVES,
Washington, D. C., Monday, January 28, 1901.

The committee met at 10 o'clock a. m.

Present, Representatives Tongue (chairman), Barham, Jenkins, Ray, Reeder, Phillips, Sutherland, Wilson, Gaston, and King.

Present, also, Representatives Newlands and Mondell.

Also Frederick H. Newell, hydrographer of the United States Geological Survey, Washington, D. C., and George H. Maxwell, of San Francisco, Cal., chairman of the executive committee of the National Irrigation Association.

STATEMENT OF HON. FRANCIS G. NEWLANDS, OF NEVADA.

Mr. NEWLANDS. Gentlemen, I have two bills pending before this committee relating to the reclamation of arid lands. One of those bills (H. R. 12844) is confined entirely to the State of Nevada and embraces only one river in that State, the Humboldt River, stretching from the eastern to the western part of the State—a distance of between 300 and 400 miles. The other bill is a general bill (H. R. 13846), relating to the reclamation of arid lands throughout all the arid and semiarid States, embracing in its operations thirteen States and three Territories—nearly one-third of the entire country.

[H. R. 12844, Fifty-sixth Congress, second session.]

A BILL for the disposition and settlement of arid lands, and for the construction of reservoirs and necessary hydraulic works for the storage of water on and near the Humboldt River, Nevada.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That the Geological Survey be, and it is hereby, directed to finish surveys and prepare specifications for the complete storage and utilization of the flood and excess waters of Humboldt River in the State of Nevada.

SEC. 2. That the Director of the Geological Survey shall make a report to the Secretary of the Interior as to each reservoir, diverting canal, or other hydraulic work, showing the capacity and cost of construction, also the location of the public lands to be reclaimed, as well as all other facts relative to the practicability of the utilization of the flood or waste waters.

SEC. 3. That upon the filing of such report, or completed portions thereof, the Secretary of the Interior may, in his discretion, withdraw from public entry the lands embraced within the reservoir site, at high-water mark, and a strip of land three hundred feet in width bordering the same, and also the land for one hundred feet on each side of the center line of the diverting canals, or other hydraulic works, to be constructed as heretofore noted, together with the public lands which it is proposed to irrigate by the waters held in the reservoirs.

SEC. 4. That for the construction of a reservoir on Rock Creek, a tributary of Humboldt River, and diverting canals, there be, and the same hereby is, appropriated the sum of one hundred and thirty-six thousand seven hundred and eighty dollars, in accordance with the estimates of the hydraulic engineers of the Geo-

logical Survey, reported to the Secretary of the Interior, and printed in Part Four of the Twentieth Annual Report of said Survey.

SEC. 5. That for the construction of the lower Humboldt reservoirs and hydraulic works there be, and the same hereby is, appropriated, out of any money in the Treasury not otherwise appropriated, the sum of one hundred and forty-eight thousand three hundred dollars, as estimated by the hydraulic engineers in the respect above named.

SEC. 6. That upon the completion of each irrigation project hereby specified, or hereafter authorized, the public lands to be irrigated hereby shall be subject to homestead entry, after notice by the Secretary of the Interior, upon the conditions that, in addition to the requirements of the homestead Act, the entryman, upon the making of the final proof of settlement, shall pay to the Government the sum of two dollars and fifty cents per acre, and enter upon an agreement to make further payment, extending over a term of not to exceed ten years, aggregating seven dollars and fifty cents per acre, this being in consideration for the use of the stored water for the irrigation of said land. And each entryman shall be limited to the entry and settlement of forty acres.

SEC. 7. That in case the reservoirs constructed furnish more water than is needed for the reclamation of the public land, or if land in private ownership is found better situated for the utilization of the stored waters, then the right to use such water may be sold, as hereinafter provided, at the rate of ten dollars per acre, payment to extend over a period not to exceed ten years. The amount of water to be thus furnished to the land from the storage reservoirs is not to exceed two acre-feet for each acre of land, this quantity to be measured at the head of the canal, or ditch, diverting the water from the reservoir, or from the natural channel, if the latter is used in part for the conveyance of the water.

SEC. 8. That the rights to the use of this stored water to the amount above limited shall be appurtenant to the land for which such rights are obtained, and shall not be transferable to other lands, but shall be forfeited if not put to beneficial use.

SEC. 9. That the Secretary of the Interior is hereby authorized to make suitable rules and regulations for the enforcing of the provisions of this Act.

[H. R. 13846, Fifty-sixth Congress, second session.]

A BILL to authorize the construction of reservoirs for the storage of water and for other hydraulic works for the reclamation of the public lands within the arid and semiarid land States and Territories.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all moneys received from the sale and disposal of public lands in the arid and semiarid States and Territories beginning with the fiscal year ending June thirtieth, nineteen hundred and one, excepting those set aside by law for educational purposes, shall be reserved and set aside for the creation of a fund in the Treasury, to be known as the "arid land reclamation fund," for the construction of reservoirs and other hydraulic works for the storage and diversion of water for the irrigation and reclamation of arid lands.

SEC. 2. That the Secretary of the Interior, by means of the Director of the Geological Survey, be, and hereby is, directed to continue the examination of that portion of the arid region of the United States where agriculture is carried on by means of irrigation as to the advantages for the storage of water for irrigating purposes, of the practicability of constructing reservoirs, together with the capacity of the streams and the cost of construction and capacity of reservoirs, and such other facts as bear on the question of storage of water for irrigating purposes as required by the Act approved March twentieth, eighteen hundred and eighty-eight, and also to investigate the practicability of diverting large rivers by means of tunnels or other works, and of providing supplies by means of artesian wells.

SEC. 3. That the Director of the Geological Survey shall from time to time make reports to the Secretary of the Interior as to each of various proposed reservoirs, diverting canals, or other methods of procuring water, said reports to show the location, cost of construction, quantity, and location of such land as can be irrigated, as well as the other facts relative to the practicability of the enterprise.

SEC. 4. That upon the filing of such report the Secretary of the Interior may, in his discretion, withdraw from public entry the lands required for reservoir or other hydraulic works, together with the public lands which it is proposed to irrigate from such works.

SEC. 5. That upon the determination by the Secretary of the Interior that each of the said projects of reclamation is practicable he shall cause to be let, upon proper public notice, contracts for the construction of the same, in whole or in

part. payments to be made from the arid land reclamation fund: *Provided*, That no such contract shall be let until the necessary funds are available: *And provided further*, That in all construction work eight hours shall constitute a day's work and none but citizen labor shall be employed.

SEC. 6. That upon the completion of each irrigation project, the total cost thereof shall be ascertained and the amount divided pro rata per acre of the lands to be irrigated thereby, and that said amount shall be made a charge against the lands as the cost of a right to the use of water from said system of irrigation, and that said public lands shall be subject to homestead entry, after notice by the Secretary of the Interior, upon the condition that in addition to the requirements of the homestead Act the entryman shall make payment to the Government of the cost per acre of water right as above ascertained, said payment to be made in not to exceed ten annual installments, and each entryman shall be limited to the entry and settlement of eighty acres, or such lesser amount as the Secretary of the Interior may designate, and the moneys thus received shall be covered into the arid land reclamation fund: *Provided further*, That the right to the use of the water shall be perpetually appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

SEC. 7. That in case the water thus provided shall be more than sufficient for the reclamation of the public lands, or if land in private ownership has been found by the survey above authorized to be better suited for the utilization of the stored or divided waters, or if there is a sufficiency for both, then the right to use such water may be sold at the rate as above ascertained and under the same terms; but no water right shall be granted to any landowner or occupant for an amount exceeding eighty acres. The proceeds of such sales shall be covered into the arid land reclamation fund.

SEC. 8. That the following shall be considered as arid land and semiarid land States and Territories within the meaning of this Act: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, Wyoming.

MR. BARHAM. Will it interrupt you if I ask you a question right there as to your first bill (H. R. 12844)? Does that bill cover or include a complete watershed?

MR. NEWLANDS. Yes; the other is a general bill. The bill relating to Nevada simply takes up the Humboldt River, and provides for the construction of two reservoirs, one on Rock Creek, a tributary of that river, and the other just adjoining the river, taking advantage of a natural depression. The total cost of these two enterprises will be something over \$300,000. The bill makes an appropriation for this amount. It provides that the Secretary of the Interior, upon making the survey, shall determine what public lands are subject to this storage of water and can be benefited by it; it provides that they shall be withdrawn and set aside, and that they can be entered in areas of not exceeding 80 acres, subject to a payment of \$2.50 for the land and \$7.50 for the water right.

MR. REEDER. I have noted the fact that the average size of irrigation farms in New Mexico is something less than 7 acres. My own experience is that a man will have no use for 80 acres of irrigated land for the purpose of raising crops.

MR. NEWLANDS. The unit varies according to the locality. As you go to the south, where you can cultivate citrous fruits and nuts, and things of that kind, the unit of entry may be made very much smaller. But in the north, where you rely mainly upon alfalfa and products for fattening cattle, I think the unit of 80 acres is about right.

MR. REEDER. That is true.

MR. NEWLANDS. In the second bill which I have drawn (H. R. 13846), the bill for general reclamation, it is provided that the Secretary of the Interior may determine the unit of entry (not exceeding 80 acres), so that he can adapt the unit to the locality.

My bill with reference to the Humboldt River (H. R. 12844) also provides, as to lands now occupied, that water rights can be acquired

upon the payment of \$10 an acre. This sum is equal to the entire charge for Government land, inclusive both of the entry and the water rights. Remember, it is \$2.50 for the land entry and \$7.50 for the water.

Mr. BARHAM. That gives the complete water right for all time?

Mr. NEWLANDS. Yes, sir; subject, however, to beneficial use. If the water is not used it becomes forfeited. That has now become one of the settled doctrines of the arid region—that title depends upon use.

Now as to the second bill (H. R. 13846):

The second bill relates to the entire country, and, in my judgment, it meets many objections which have been urged by our Eastern and Southern friends against a scheme of national importance.

In the first place, let me say something upon the question whether this great work should be intrusted to the United States Government, to the States, or to private enterprise.

As to private enterprise, under existing laws it is utterly impossible to make reclamation, for the reason that any reclamation scheme involves a very large expenditure in the storage of water, a very large expenditure in the main canals, and a very large expenditure in the diverting ditches, and it is absolutely essential to obtain the control and the ownership of large areas of land in order to make a storage and reclamation enterprise profitable or even compensatory of the expenditure made.

The policy of the Government has never been to grant large tracts of land to individuals or corporations. The whole policy of the Government has been against land monopoly and has been intended to secure homes for actual settlers. The entire West was settled up under the preemption and the homestead laws. It was found that the preemption law was subject to evasion; that it enabled people, in violation of the spirit of the law, to acquire control of considerable areas of land, and so that law was abandoned and we now rely entirely upon the homestead law. The latter law provides that a man must live upon a tract of land for five years before he can get a title to it, but it gives him the right to commute, after a residence of fourteen months upon the land, by the payment of \$1.25 an acre. So that unless we revolutionize the policy of the country as to land monopolies, we must concede that this matter can not be intrusted to private capital.

Now as to State control: We from the West object to the transfer of the arid lands to the States, in the first place for the reason that many of the States are so impoverished that they would be unable to undertake any great work of this kind, and, in the second place, for the reason that they rarely exercise a trust of this kind providently. In fact, it may be said that they never exercise it providently.

Take the great State of Texas, which owns its own public lands. I think it is generally admitted that those lands have been improvidently parted with. Five millions of acres, I believe, were given in one grant for the construction of a State capital, or something of that kind; and the result is that Texas, in the near future, will be struggling under the evils of land monopoly, and there will be a general protest against it.

In California we find that the land grants given by the Mexican Government have operated against the development of that State—grants involving from 30 to 200,000 acres. You may say that the owners of those lands will find it to their interest to part with them, but that is not human nature. It is human nature to hold on to land.

The result is that these grants of great areas of land in California have seriously impeded the development of that State. The tendency of a State is, just as soon as it gets a grant, to try to get rid of it as soon as possible by realizing upon it.

Mr. BARHAM. And the same thing occurred in California in regard to swamp and overflowed lands.

Mr. NEWLANDS. Yes; they fell into the hands of monopolists.

The CHAIRMAN. The same thing occurred in Oregon as to the swamp lands there.

Mr. NEWLANDS. We want to promote a policy which will induce the settlement of the country of which I have been speaking in small tracts for homes—tracts aggregating in area not more than 80 acres; and we want oftentimes to make the unit of entry smaller than 80 acres, according to the character of the cultivation, the climate, and the soil.

What objection is urged against us? The objection in the East is that it is proposed to tax the entire country for the improvement of a section——

Mr. BARHAM. One moment, before you get to that question. It is an important one; but before you get to it let me ask you this:

Is it not true that in addition to what you have said we have to deal with the interstate navigable streams, which a State could not by any possibility control?

Mr. NEWLANDS. That is true. These interstate questions also present themselves; for there is hardly a State which is watered by a river which has not interstate complications. Take the State of Nevada, for instance. Three out of its four rivers have their source in California.

Mr. JENKINS. Would not the Federal Government meet with the same embarrassment on the other side?

Mr. NEWLANDS. No; because the operations of the Federal Government, of course, embrace the entire Union. Upon the other hand, suppose that a State were entering upon a scheme of State improvement. It certainly could not, or, at all events, it would be a difficult question as to whether it could, erect works outside of the State, in a neighboring State, probably subject to the taxation of that State. All these embarrassments would arise in the administration of a scheme of that character, and would form an obstruction to it. But beyond all that, I want to place particular emphasis upon the fact that a State will not exercise a trust of this character wisely and providently. I place more stress upon that point than upon anything else.

Recollect, now, that we already have this United States Geological Survey. It has been in operation now for twenty-two years. It has the confidence of the people. It has a corps of scientific men who are unsurpassed in their line, and those men have made studies of that entire Western country for the last twenty years, and are now prepared to undertake this work.

Mr. BARHAM. I want to make this suggestion in answer to the question suggested by Mr. Jenkins. The Government controls the bridging of navigable streams. So, upon a parity of reasoning, the Government, in legislating upon this subject, would also control the question of the navigability of the streams to the extent of their being affected by this irrigation scheme.

Mr. JENKINS. Yes, Mr. Barham; but that has relation, of course, to existing streams. The question in my mind was as to whether or

not the Federal Government can go into a State and undertake its development.

Mr. BARHAM. That will raise the question of riparian rights. That is probably the question here.

The CHAIRMAN. I had this question in mind, Mr. Newlands; it is probably the same as that raised by Judge Jenkins. The owners along the banks of the streams are entitled to the flow of waters in their customary channels. Now, has the Government a right to go above that, create dams and reservoirs, and then divert the water from the streams out over the public lands, so as to prevent its flowing in its accustomed channels, and so take away a vested right of the citizen?

Mr. NEWLANDS. That would possibly be a question under the doctrine of riparian rights.

Mr. WILSON. I think I can answer that question, so far as most of the arid-land States are concerned. They have, in their State constitutions, abrogated the old doctrine of riparian rights. All of the arid-land States have done that. As far as Idaho is concerned, I was a member of the convention which framed its constitution; and the old doctrine has of necessity been abrogated, because the conditions existing there made such a step absolutely essential for the development of the country. So that it is no longer the law in any of those States that a stream shall flow "undiminished in quantity and undefiled in quality" past a man's land. It can all be appropriated and diverted, and he may be left nothing but the bare channel. That is the law in all the arid-land States; and the Supreme Court of the United States has sustained the State courts in upholding that provision of the State constitutions.

The CHAIRMAN. Our State (Oregon) has no constitutional provision of the kind.

Mr. WILSON. But most of your State is not arid. That is the reason for that.

Mr. BARHAM. California follows the same rule. That is what I wanted to get before this committee, because it is a continual stumbling-block with men who understand the old English common-law system of riparian rights. We can get rid of that difficulty easily enough, however, in the arid-land district. That was the point I wanted to make.

Mr. NEWLANDS. There are some of these States—I imagine California is one and Oregon is another—which have not as yet reached the advanced doctrine of the intermountain States. Mr. Wilson states the fact regarding those States. They have entirely done away with this doctrine of riparian rights. But practically the question will not arise, for, recollect, it is only the flood waters that are stored in these reservoirs; and in most of the arid-land States the doctrine is now recognized that when a man stores water he is entitled to take it out below, using the stream simply as a channel for carrying his water, and his title to it is recognized. Laws to that effect have been passed in a number of States.

Mr. JENKINS. It is rather a question in my mind beyond the doctrine of riparian rights. Of course, when we talk about riparian rights we ordinarily refer to the rights of a party on a stream already in existence. Now, we are making quite a departure. We are suggesting the idea of the Federal Government going into a State and taking possession of lands there, and making a canal, so to speak, for the purpose of conducting water. A person living on that stream would not have what we call riparian rights. He would only have

what might be called statutory rights. Riparian rights are common-law rights.

Mr. BARHAM. Belonging to the State.

Mr. JENKINS. They may belong to the State, and individuals may have riparian rights. But inasmuch as I am going to be largely influenced by gentlemen like Mr. Newlands (who lives in a locality interested in this matter, and who has had large experience with these questions), I want to see whether or not he has considered what I consider the fundamental question involved in this matter, which is as to the power of the Federal Government and the power of the States—whether it would be necessary to unite the two, or whether the Federal Government can go on absolutely independent of the States. I raise that question here because I am going to ask to be excused in a moment. This is a matter in which I am greatly interested; but we want to prepare amendments on several District bills which we hope to get up.

Mr. NEWLANDS. Will you allow me to pass the question which you have raised for a moment, so that I can explain the provisions of this second bill? I would like you to understand it.

This second general bill (H. R. 13846) is intended to meet the objection that the entire country is to be taxed for the improvement of a particular section. Of course, we think that is a very narrow view, but this bill is intended to meet it. There seems to be a general disposition, on the part of those who oppose the Government going into this work, to grant these lands to the arid States and let them settle these complications themselves. We are opposed to that course, because we want the Government to undertake this work.

Mr. JENKINS. Independent of your opposition, it would not be either right or practicable or beneficial.

Mr. NEWLANDS. No; now, this general bill (H. R. 13846) which I present provides that all moneys received from the sale of public lands in the arid and semiarid States shall be put into a special fund in the Treasury, to be called the "arid-land reclamation fund." It provides, then, that the Secretary of the Interior, through the Geological Survey, shall make plans and estimates of the cost and the feasibility of irrigation schemes through the arid and semiarid States, and that wherever the Department of the Interior deems a plan practicable it shall withdraw the lands embraced within that plan from the general operation of the land laws. It then provides that the construction of these works shall be commenced, and that the lands subject to them shall be subject to entry, under the homestead law, in areas not exceeding 80 acres; that the total cost of each project shall be fastened *pro rata* upon the acreage benefited by it, and that that total cost shall be repaid in ten annual installments. The money raised in this manner is to go into the "arid-land reclamation fund," and to be used over and over again in other enterprises of a similar character.

This bill creates a revolving fund, derived from the sale of public lands in the region that will be reached by it. The plan suggested will be self-operating; in fact, almost automatic. It will require no further action by the Congress and no appropriation from the Congress except the devotion of these moneys to this particular purpose.

Mr. SUTHERLAND. Does the bill provide for a system of artesian wells for experimental purposes?

Mr. NEWLANDS. Yes; it provides for reservoirs, for the diversion of rivers, and also for artesian wells, as a part of the project. It puts the whole thing under the control of the Secretary of the Interior and

the Director of the Geological Survey. It permits the Secretary, when a project is determined to be feasible, to let contracts for the construction, either in whole or in sections; and it provides that no contract shall be made unless the money for its payment is already in this fund. It also provides, as to lands already occupied, that if there is more water stored than is sufficient for the public lands, or if it can be used more conveniently upon lands already occupied, water rights can there be granted in the discretion of the Secretary of the Interior, subject to the same payments; but the condition is made that he shall not grant a water right of more than 80 acres to any one person.

As you see, the effect of that provision will be to gradually destroy the existing land monopoly. In the State of Nevada we have a land grant of 2,000,000 acres, given by the General Government for the school fund there. That land has been most improvidently granted by the State; and the result is that the whole of it is now held in very large tracts by individuals. There is one man, in one of the richest valleys on the Humboldt River, who owns 14,000 acres—half of it acquired under the school grant and half of it acquired through the railroad grant. These lands are directly on the river, and could be divided up into tracts of 40 or 80 acres, which would support hundreds of families.

Suppose this reservoir scheme goes through. This man, of course, would like to get from the General Government water rights for his whole 14,000 acres. He could not do it. The Government says to him, "You must divide up your territory into 80-acre farms; then we will grant each one of those men a water right for 80 acres, upon the payment of a proportionate part of the entire cost in ten annual payments." Such a provision does no injustice to the landowner, for the very presence and execution and completion of this project gives additional value to his land, enabling him to sell it at a better price.

Mr. JENKINS. Will not a large quantity of these lands be benefited by the fact that other lands around them are improved?

Mr. NEWLANDS. Oh, yes. There is no question that projects of this kind would increase the values of all the adjoining lands which are in private occupancy, because there is certain to be more or less seepage or percolation of water—

Mr. JENKINS. Can not that improvement be assessed on those lands, just as in the case of street improvements?

Mr. NEWLANDS. I think it would be difficult to do that; but I do not consider it necessary. I think it would be a very complicated matter.

Mr. REEDER. It would be almost impossible to estimate it.

Mr. NEWLANDS. This bill also provides that moneys received from the sale of public lands for the fiscal year ending June 30, 1901, shall go into this fund. That fiscal year is about half completed, and it would provide, I think, between \$1,000,000 and \$2,000,000. The public-land sales during the last six or seven years have ranged from \$864,000 in 1897 up to \$2,836,000 in 1900.

The CHAIRMAN. Does your bill provide for putting the proceeds of the entire sales of the public lands into this fund?

Mr. NEWLANDS. Yes; simply in the arid and semiarid States, however.

Mr. SUTHERLAND. You make no direct appropriation as a beginning, do you?

Mr. NEWLANDS. No; we simply dedicate the funds that have been received for this fiscal year to this fund, and those moneys form the

commencement of the fund. In this entire arid and semiarid region there are about 600,000,000 acres of land. The most intelligent estimate is that the total amount to be reclaimed by irrigation will not exceed 75,000,000 acres. In some places the estimate is given as 100,000,000 acres, but I think 75,000,000 acres is a better estimate. It will take thirty or forty years, or perhaps fifty years, to accomplish that. So it means simply the gradual reclamation of these lands. In addition to that, it means that a greater value will be given to the other lands which are now used as pasture lands.

Mr. SUTHERLAND. Do I understand that 75,000,000 is the sum total of the acres of land out of the 600,000,000 that could possibly be reclaimed, in all?

Mr. NEWLANDS. Yes; in all.

Now, what do we say as to the 525,000,000 acres remaining? That is all pasture land, mountain land. There is free range there at present. The Government gets nothing from it. The result of the improved cultivation of the valleys and river bottoms will be that there will be a more provident system of cattle and sheep raising in that country. At present it is most improvident, because the cattle and sheep range over those vast areas of land, and when a terrific snowstorm comes on in the winter, concealing the grasses, they perish by the thousands. Now, the provident system of cattle raising means that great quantities of hay will be stored in the valleys just for such purposes, and if the agricultural region is increased in that way the pasture conditions will vastly improve, and some method will be devised for selling or leasing these pasture lands. The total cash receipts from the disposal of public lands during each fiscal year, from July 1, 1895, to June 30, 1900, from the report of the Secretary of the Treasury, are as follows:

1895.....	\$1, 103, 347	1898.....	\$1, 243, 129
1896.....	1, 005, 523	1899.....	1, 678, 246
1897.....	864, 581	1900.....	2, 836, 883

Mr. JENKINS. I understood they were not selling public lands now. Am I wrong in that?

Mr. WILSON. The desert-land law, which is the only general law now on the statute books (besides the homestead law) authorizing the disposition of public lands, provides that the applicant shall pay \$1.25 an acre for the land after reclaiming it, and under the homestead law, when the entryman commutes at the end of fourteen months, he pays \$1.25 an acre. In a great many States where Indian reservations have been opened there have been, until the passage of the free-homestead law last session, provisions that various sums, ranging from \$1.25 to \$3.75 an acre, should be paid for land. It is from these various sources that this money comes. The homesteader who lives on his land for five years pays nothing for it, except the Land Office fees. A great many of them commute. A man who wants to get his title before that time does this. Judge Jenkins is right when he says that the homesteader who lives on his land five years pays nothing for the land. All of the others, however, do.

Mr. JENKINS. I understood that public lands were not now for sale.

Mr. WILSON. They are not for sale; they are not sold. You know that the title to a great deal of land in the arid region is secured through the desert-land law, and for all of that land you must pay \$1.25 an acre. That, I suppose, amounts to a great many hundreds of thousands of dollars.

Mr. BARHAM. Then your scheme would include the expenditure of about \$750,000,000 at \$10 an acre?

Mr. NEWLANDS. That is assuming that the reclamation will cost \$10 an acre. Much of it costs much less.

Mr. WILSON. But, just there, a great many millions of acres will be reclaimed by private individuals during this time. For instance, hundreds of thousands of acres in each State are continually being reclaimed by private individuals, so that the Government will never be called upon to expend that \$750,000,000. I do not suppose a fourth of it will be expended.

Mr. NEWLANDS. Whatever is done makes no difference, because under the automatic regulation of this bill we simply put the moneys received from the sale of lands into the reclamation fund, and go on with more work, and there is no expense to the Government.

Mr. WILSON. A question with regard to your bill before you sit down.

The law now provides that 5 per cent of the receipts for the sale of public lands shall go to the States for school purposes. Of course we do not want to repeal that law.

Mr. NEWLANDS. No; there is also a bill now pending, which has passed the Senate, which organizes schools of mines and makes those schools of mines a charge upon the public-land fund. I will put an exemption in the bill providing that all moneys received from the sale of lands, except those devoted to educational purposes, should be used for this purpose. That exemption would include this 5 per cent of which you speak.

Mr. WILSON. To illustrate how these 75,000,000 acres will never have to be reclaimed by the General Government: I have in mind an irrigation system where I live. There are 75,000 acres under the canal. There are 20,000 acres under cultivation—a high state of cultivation, mostly fruit cultivation. The canal has been constructed five or six years, but it is being enlarged now, so that that canal would undoubtedly irrigate the whole 75,000 acres. The Government will never be called upon to irrigate an acre of it. In fact it would not be permitted to do so. The land is very valuable. So there you have the difference between 20,000 and 75,000, or 55,000 acres under one canal, in one State, that would be taken out. I suppose there are a great many instances like that.

Mr. NEWLANDS. Now, I want to say one word, if you will permit me, about the State of Nevada itself. I presume what I say with reference to it will illustrate the conditions in other States.

We have a population of only 43,000. Twenty years ago we had 63,000. It is not generally known that Nevada has produced more of the precious metals than any other State of the Union. Over \$600,000,000 worth of precious metals have been produced there; but the profits received from the mines have all gone out of the State. There has never been organized there a commercial emporium like Salt Lake City or Denver, at which enterprises could be conducted throughout the entire State. The agricultural interests have never been promoted. The mining interests are so profitable that everything in the State is of a speculative character; and when the mine depression came, through the fall in the price of silver, there was no general, equal, harmonious development in the State that could withstand the effects of that depression. So that we must now take hold of Nevada and build it up, and we must start with the basis of every Commonwealth—agriculture.

Now, the farmers of that State have already taken up the lands adjoining the rivers. It does not cost much to do that. They simply

dig a ditch and carry the water over the adjacent land and irrigate it. But the measure of that kind of cultivation is the condition of the stream at its very lowest flow, instead of its highest flow, and the lowest flow comes at the time when water is most needed—in July and August. These farms, therefore, are very limited, and wherever anybody else now takes up a farm and proposes to water it, he finds an abundance of water in April, May, and perhaps in June, and no water at all at the time when it is most needed. So that it is utterly impossible to continue the agricultural development of Nevada under existing conditions.

You will ask, "Is there water that can be secured for these lands?" We have four large rivers—one, the Humboldt River, stretching from the eastern part of the State to the western, a distance of about 400 miles, with one of the richest valleys in the world. The lower part of the valley is as rich as the valley of the Nile. Wells have been dug 100 feet deep and never gotten to the bottom of the soil. It is a rich, alluvial deposit that will produce everything.

What is the character of that river? It is a torrent in the latter part of March, April, and May, and it is a mere thread in July, August, and September. Where do those waters go? They flow into a sink of the desert called Humboldt Lake. The water is in the lowest part of the desert, and of course it is impossible to utilize it, because it is impracticable to lift water for the purpose of irrigating land. Dependence must be placed upon gravity.

That lake measures the unutilized water of the river. The problem is to substitute for that lake artificial lakes at the sources of the tributaries of the Humboldt River and along the river itself in natural depressions, where dams can be inexpensively constructed and the water can be held so that it can flow by gravity to these lands where it is most required.

The other three rivers of which I have spoken take their source in the Sierra Nevada Mountains, which are the source of the great rivers of California (the Sacramento, the King River, and the San Joaquin River); but their waters flow to the east instead of to the west, as the California rivers do. The California rivers flow into the ocean and lose their waters there. Our waters flow into great lakes in the sink of the desert, and there is at the foot of the Truckee River a lake 35 or 40 miles long, 10 or 15 miles wide, in the sink of the desert, which measures the unutilized water of the river. There is at the foot of the Carson River a similar lake called Carson Lake. Then there is at the foot of the Walker River a similar lake called Walker Lake, an immense sheet of water, and so on. Storage in these lakes is comparatively inexpensive. The whole matter has been investigated at the source of the Truckee River. We find that water can be very inexpensively stored there, and that hundreds of thousands of acres can be brought under reclamation if it is so stored.

"Now," you ask, "why is it not done by private enterprise?" The people of the Truckee Valley only have 30,000 acres under cultivation. They are prosperous, but still they are only small farmers, having 160 acres of land apiece. They are unable to comprehend a big scheme of this kind, and they have not the means to carry it out in any event. Besides that, they have the water for their land, and that is all they need. Now, we want to enter up other large areas of land belonging to the Government. Who is to do it? You do not want to make a grant to a corporation for the purpose of doing it, because that tends to land monopoly. You do not allow individuals

to take out large tracts, for that tends to land monopoly. The question is whether it is not the obligation and the duty of the Government, which is the owner of this land, to see to it that it is put in condition for settlement. You survey land in order to put it in a condition for settlement. If it is necessary, in addition to that, to survey the waters that supply it: is not that a governmental duty and obligation, just as the survey of the land is? It belongs to the Government. It is an obligation, a duty, that belongs to it by reason of its ownership. Apart from its governmental capacity, if that is done, Nevada will advance, and everything else will advance. It will tend to the development of her mineral wealth. As it is, Nevada has a "black eye." We have been served by a railroad which never has made an effort to colonize it. Why? Because the Central Pacific Railroad was owned by the promoters of the Southern Pacific. The Southern Pacific was a through, transcontinental line, and they wanted their business to go on the long haul, and all possible business was diverted to the Southern Pacific. Then they had a difficulty with the Federal Government upon the question of subsidy; and the result of the discussion was that the popular impression was created throughout the country that that railroad was worthless, and that the Government ought to practically give it away, because it passed through a worthless State. Every other transcontinental road has been the colonizer of every State through which it has passed. The road was built first and the country settled afterwards.

We regard this State, in effect, as a railroad "bridge" from Ogden to California. Now, just look all through the territory to the north and south. What do you find? Seven or eight intermountain States or Territories whose populations, in the past twenty years, have increased threefold. Nevada's population has diminished one-third. Now, nature did not give all the advantages to these other States that surround her. Nevada has the same advantages. The whole question is one of governmental and railroad policy.

MR. WILSON. Is it not a fact that Nevada has increased wherever there were agricultural settlements?

MR. NEWLANDS. Yes; Reno is now the leading town in the State, through its location in an agricultural country.

MR. BARHAM. In other words, there are large farms where alfalfa and all that sort of thing grow. There are just as beautiful agricultural interests there as any in the world.

MR. NEWLANDS. I ask special consideration for Nevada. I believe in this general reclamation scheme, if you are disposed to consider that, but I ask special consideration for Nevada. Recollect, it was pulled into the Union in 1864 against its will. Its people rejected their constitution in the first place. They did not feel that they had a population sufficient to sustain the burden of statehood. But the patriotic men of Washington sent telegrams there, as did the Republican newspapers, urging them that it was a patriotic duty on their part to come in to assist in reconstructing legislation; and they acquiesced and came in.

MR. BARHAM. Now, I would like to have your opinion on this proposition: Does not your bill, after all, amount to an appropriation of public funds, because the proceeds of the sale of these lands would go into the Treasury of the United States? What I want to get at, then, is this: Would it not be just as well to come squarely before the people and say, "We propose to appropriate enough public funds to carry out this project, until the money is paid back into the Treas-

ury of the United States. We will assess these lands at the rate, say, of 75 cents or \$1 an acre, until all of the money appropriated to carry out this great scheme has been repaid to the Treasury," just as was done in the case of the Union, Central, and Western Pacific railroads. What I mean to say is, why do we not go right square at the proposition, and say, "Gentlemen, here is what the people want"—and they do want it, I believe—instead of pretending to dodge around by saying that "the sale of the arid lands is going to pay this money:" because they will understand that themselves. Take the bull squarely by the horns, and appropriate the money out of the Treasury of the United States, with the tax of so much an acre, sufficient to ultimately repay the Government, and let whoever uses it—railroads, private owners, or anybody else—pay 75 cents or \$1 an acre. Give the preference to the homesteader, but make it 80 acres to the settler.

Mr. NEWLANDS. Well, I doubt whether the Government could enter upon a scheme of assessing lands in the States for local improvements in the States.

Mr. BARHAM. Now, what I mean is, if private owners or railroads use this water, they should pay \$1 an acre for it.

Mr. NEWLANDS. If they use it.

Mr. BARHAM. If they use it; yes. Now, as to the public lands, of course we can make any rule we please about them. Now, why not go squarely before the people and say: "Yes, it will develop the railroad lands; it will develop the lands of the State; and we will assess them \$1 an acre, or 75 cents an acre, or whatever will ultimately repay the Government?"

Mr. NEWLANDS. I have no objection to that at all. On the contrary, I would advocate it; and I have a bill—H. R. 14072—drawn up on that basis—a bill after the pattern of the river and harbor bill—making a specific appropriation at this time for the commencement of projects which have already been planned and estimated upon by the Geological Survey and providing for estimates (as in the case of the river and harbor bill) for work that is projected. Each member of Congress has the right to go before the committee and present his project, and ask for an estimate and a plan regarding it. I am in favor of such a bill. But we find that those who are opposed to this scheme of the Government paying out moneys for the reclamation of lands are willing to grant the lands to the States. If they are willing to grant the lands to the States, they ought to be willing to set aside the proceeds from the sales.

[H. R. 14072, Fifty-sixth Congress, second session.]

A BILL For the construction of public works regulating the flow of the rivers of the arid region of the United States, storing the water, and continuing surveys.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums of money be, and are hereby, appropriated, to be paid out of any money in the Treasury not otherwise appropriated, to be immediately available and to be expended under the direction of the Secretary of the Interior and the supervision of the Director of the Geological Survey, for the construction, completion, and operation of the storage and reclamation works hereinafter named and for the surveys hereinafter named.

ARIZONA.

Toward the construction of a dam and reservoir on Gila River, Arizona, near San Carlos, as described in the report entitled Water Supply Paper Numbered Thirty-three, of the United States Geological Survey, one hundred and fifty thousand dollars.

CALIFORNIA.

Toward the construction of dams on Kings River, at the locality known as Clarks Valley, as described in Senate Document Numbered Fifty-nine, of the Fifty-sixth Congress, second session, fifty thousand dollars.

Toward the construction of the Hetch Hetchy Reservoir, as described in the Twenty-first Annual Report, Part Four, of the United States Geological Survey, page four hundred and sixty-five, fifty thousand dollars.

For construction of a reservoir on Clear Lake, California, fifty thousand dollars.

MONTANA.

Toward the construction of the nine miles of diversion canal from Saint Mary River, Montana, as described in the report of the United States Geological Survey, one hundred and fifty thousand dollars.

NEVADA.

Toward the construction of a reservoir on Rock Creek, Nevada, as described in the Twentieth Annual Report, Part Four, United States Geological Survey, page four hundred and forty-five, thirty thousand dollars.

Toward the construction of reservoirs and diversion works on Humboldt River, in Nevada, as described in the Twentieth Annual Report, Part Four, United States Geological Survey, forty thousand dollars.

Toward the construction of reservoirs on the Truckee River, in California and Nevada, as described by the United States Geological Survey, eighty thousand dollars.

WYOMING.

For the construction of a reservoir on Grey Bull River, Wyoming, as described by the United States Geological Survey, forty-nine thousand nine hundred and sixty-two dollars.

ARIZONA.

For surveying sites in Arizona, determining amount of water in Gila and Salt rivers, including Santa Cruz River, and investigating artesian conditions, six thousand dollars.

CALIFORNIA.

For surveys in northern California of reservoir sites on head waters of Kings, Kern, and San Joaquin rivers, ten thousand dollars.

For the examination and mapping of underground waters in San Joaquin Valley, California, five thousand dollars.

For the examination and mapping of underground waters in San Bernardino Valley, California, five thousand dollars.

For the examination of the country adjacent to Colorado River, in California and Arizona, and estimates of cost of utilizing the Colorado River by pumping or by gravity canals, eleven thousand dollars.

COLORADO.

For surveys in Colorado of reservoir sites on head waters of Platte River, four thousand dollars.

For the examination of the feasibility of storing water in northeastern Colorado, three thousand dollars.

For the examination of reservoir sites on Arkansas River and Rio Grande, in Colorado, eight thousand dollars.

For reconnaissance for diversion of Gunnison River, in southwestern Colorado, five thousand dollars.

For the examination of underground waters and drilling test well in eastern Colorado, sixteen thousand dollars.

IDAHO.

For a survey for diversions of water from Snake River, Idaho, and obtaining underground waters on Snake River plains, five thousand dollars.

For examination of reservoir sites on head waters of Boise, Weiser, and Payette rivers, of eastern Idaho, four thousand dollars.

KANSAS.

For drilling test well in northwestern Kansas, sixteen thousand dollars.

MONTANA.

For the continuation of the Saint Mary River surveys, Montana, seven thousand dollars.

For the continuation of the Madison River, Helena survey, Montana, five thousand dollars.

For the diversion of waters from Yellowstone River, Montana, eleven thousand dollars.

NEBRASKA.

For drilling test well, adjacent to southwestern Nebraska, fifteen thousand dollars.

NEVADA.

For the continuation of reservoir surveys on Carson, Muddy, Virgin, and Walker rivers, Nevada, ten thousand dollars.

For investigation of artesian conditions in Lemon and Warm Spring and other valleys in Nevada, five thousand dollars.

NEW MEXICO.

For survey of reservoir sites on Rio Grande, New Mexico, six thousand dollars.

NORTH DAKOTA.

For continuation of mapping of underground waters in North Dakota, three thousand dollars.

OREGON.

For continuation of examination of deep waters in northwestern Oregon, four thousand dollars.

For exploration for reservoir sites on head waters of Owyhee and Malheur rivers, Oregon, five thousand dollars.

SOUTH DAKOTA.

For the investigation of deep waters in western part of South Dakota, drilling test well, fifteen thousand dollars.

TEXAS.

For water storage in trans-Pecos, Texas, five thousand dollars.

UTAH.

For surveys of storage reservoirs on the Sevier River, four thousand dollars.

For the examination of head waters of Provo and Weber rivers, Utah, three thousand dollars.

For reconnoissance for diversion of Grand and Green rivers, in southeastern Utah, five thousand dollars.

WASHINGTON.

For surveys of reservoir sites on head waters of Yakima River, Washington, and tributaries, six thousand dollars.

For the examination of artesian conditions of central Washington, four thousand dollars.

WYOMING.

For surveys of storage and diversion of Green River, Wyoming, and tributaries, six thousand dollars.

For surveys for conservation of water on North Platte River, Wyoming, four thousand dollars.

Mr. BARHAM. That has not been the showing before this committee. I have been here for six years; and while nearly every one of us was in favor of granting the lands to the States, yet the people take the same view of it that you do—that the same result would follow as was the case in regard to the California land grants of swamp and over-

flowed lands: and these men would ultimately come into the ownership of large tracts of land, ruining the very object intended. The people are not in favor of granting the land to the State.

Mr. NEWLANDS. I am not talking about the people. I am talking about objectors in Congress. The men who object to the reclamation of the arid lands of the West say, "If you will bring in a bill granting the arid lands to the West, we will acquiesce."

Very well; now, I reply to them, "We do not want to grant all the lands, because we know that these lands will be improvidently disposed of. We want you to hold them, but we want you to turn over the proceeds of those lands (which is the same thing) to a fund for reclamation purposes." Now, I admit that the purpose of this bill is to do away with the objection which is urged by these men—an objection which I do not regard as reasonable.

There is another thing: They say, "We commence to-day with an appropriation of one, two, three, or four million dollars. How do we know but that next year, or five years from now, we will be called upon for fifty millions? There is room for the exercise of the greatest imagination about it." But this bill absolutely limits the expenditures to the amount that is in the fund, and it limits the fund itself to the proceeds of these lands: so that it absolutely relieves the minds of these men of this apprehension of the commencement of a great scheme that is intended to tap the public treasury for the benefit of a particular section.

Mr. SUTHERLAND. And it places no burden upon the General Government at all?

Mr. NEWLANDS. It places no burden upon the General Government at all; it makes it simply a trustee for the improvement and disposal of these lands.

Mr. BARHAM. Do you not think the people understand this question quite as well as you do?

Mr. NEWLANDS. No; I do not think they do understand it.

Mr. BARHAM. Then we ought to educate them.

Mr. NEWLANDS. We have been working upon this matter now for twenty years, and so far we never have gotten, in legislation, the entering wedge. I find that in talking to many members of Congress to-day about it there is a great deal of ignorance on the subject, and more inertia and a general disposition to wait. Now, gentlemen, I do not want to wait any longer.

I would be very glad to get an appropriation such as you suggest. I think it is a good way of proceeding—just as good as the way I suggest. But I claim that this bill will accomplish the purpose that we want, and that it will do away with a lot of the objections that are presented by men who are opposed to the Government's entering upon these reclamation schemes.

(Authority was given by the chairman to Mr. Newlands and the other speakers to extend their remarks in the record.)

STATEMENT OF FREDERICK H. NEWELL, HYDROGRAPHER, UNITED STATES GEOLOGICAL SURVEY.

§1 Mr. NEWELL. Mr. Chairman and gentlemen, this question is so large that it is difficult for me to take up any one item without entering into the whole subject; but I think that the great question which has been brought up is the function of the General Government in the West.

The General Government, the people of the United States, are the owners of from three-quarters to nine-tenths of all the land in the West. In Nevada the people of the United States own 98 per cent of the State. They have, as owners, rights in those States which the States themselves do not have. The States have sometimes only the taxing power over from 1 per cent to 5 per cent or 10 or even 15 per cent of their area, as in the case of California.

The people of the United States are supreme in their control. Whenever any of the public land is disposed of they have reserved the rights for ditches and canals constructed by the authority of the United States.¹

Mr. REEDER. That is a reservation in the transfers of land, is it not?

Mr. NEWELL. I think it is in all patents for land west of the one hundredth meridian. Even if the Government did not own an acre of land in those States, it has set the precedent of going in and storing waters wherever, in its judgment, it sees fit. In the case of Minnesota and Wisconsin the Government has built large reservoirs at the head waters of the Mississippi River, and is operating those reservoirs, irrespective of any riparian rights which may be conserved.

Mr. REEDER. For what are they operating those reservoirs?

Mr. NEWELL. For the benefit of navigation; incidentally to improve the water power at Minneapolis. The Government owns the reservoirs and has appropriated over \$1,000,000 in this way. In the present river and harbor bill, I think, there are large items for continuing the erection of these reservoirs.

The CHAIRMAN. There is \$300,000 appropriated for that purpose in the present bill (H. R. 13189: Reservoirs at the head waters of the Mississippi River; continuing improvement, \$300,000). The committee regards that as a bad inheritance; but still that does not affect the question with reference to this matter.

Mr. NEWELL. A similar condition exists in California, where the Government, in conjunction with the State, is building debris reservoirs which necessarily regulate the flow of the stream, to keep the washings from the hydraulic works from getting into the streams and destroying the agricultural lands below, and injuring the navigability of the streams. There is still a third and a larger project which the Government has entered upon, and which it is committed to extend still further; and that is the policy of forest protection for the benefit of agriculture.

The forest lands throughout the West are being placed in large reservations, irrespective of State lines, for the purpose of regulating the stream flow. Those forest reserves include the mountain areas in which the land is not good for anything except the growth of trees. They are so regulated that mining can be carried on without obstruction; and it is proposed to so control them that timber can be cut and used, and yet the forests not be destroyed, but the cover retained for the protection of the streams. One step further must be taken, and that is, that the reservoir sites within those great forest areas shall be reserved, and reservoirs shall be constructed to still further regulate the flow of the streams, which is partially done by the pres-

¹ *Provided*, That in all patents for lands hereafter taken up under any of the land laws of the United States or on entries or claims validated by this act west of the one hundredth meridian, it shall be expressed that there is reserved from the lands in said patent described a right of way thereon for ditches or canals constructed by the authority of the United States. (Approved August 30, 1890. Stat. L., vol. 26, p. 391.)

ervation of the forests. In that way the precedent is already established for Governmental control and Governmental action in these matters.

The Geological Survey has been concerned with this matter since 1888, when it was authorized by Congress to investigate the extent to which the arid lands could be reclaimed by irrigation. In that and all subsequent legislation there has been no recognition especially of public lands, but simply of arid lands. The policy seems to be well established that Congress shall consider the questions of the utilization of the lands which are now arid, which are now practically useless, but which under a better form of law and administration may be made to contribute to the welfare and the wealth of the nation as a whole. That view of it this committee must take—that it is concerned not with public lands (which of course come within the function of the Public Lands Committee), but with the whole subject of making available the lands, no matter whether of private, State, or Government ownership, which are not now contributing to public welfare, but which can be made to do so by the exercise of reasonable business methods.

If the limit of reclamation is 75,000,000 acres, this does not mean that the United States Government must reclaim all of those acres, any more than in dredging out a harbor or removing an obstruction from it, the Government is committed to build the wharves along that harbor. The moment you remove the obstructions from a harbor capital flows in to build up wharves and terminal facilities otherwise prevented by the existence of natural obstructions.

The development of the West has been prevented in part by the presence of Indians. The Government has removed that obstruction; it has pushed the Indians back. Now the people of the United States are saying that the Government should push back the still remaining obstruction, and that is the drought due to the unregulated flow of the waters. It should simply regulate these streams, so that at low water they shall carry a moderate supply, and the people will do the rest.

It is obvious that private capital or State capital can not do this work of regulating the flow of the streams. It can not be made a matter of private profit, unless the corporation or the individual has such an exclusive control of the land that he can realize all the unearned increments of value; that is to say, you build a reservoir on the Humboldt River, for example; you can not control the lands along that river to an extent that you can bring back, in the shape of profits, the increased value that goes to everyone. It goes to the land owners; it goes to the general public, and you, as a citizen, can not put it back into your pocket as a proper earning.

That has been tried again and again, and foreign and eastern capital has been invested in storage enterprises under a misapprehension of the circumstances. Practically every one of those large storage enterprises is to-day bankrupt, except one or two, where there was such a monopoly that the investors controlled every acre of land which was benefited, directly or indirectly, by the presence of the reservoir.

Now, the moment you do construct a reservoir all land values rise, and the result is that while the man who puts his capital into the structure may have lost it, somebody has made far more than that reservoir cost.

We can not expect that individual enterprise will go on and build

more of those reservoirs. It can not make the profits and interest necessary to repay the investments. Consequently development along the line of water conservation has stopped, because the conservation as such can not be made profitable to the individual or the investor.

That brings up two divergent lines of action which this committee must necessarily consider. The one is the regulation of rivers whose waters are used through so many localities along such a great course that you can not place the specific benefits anywhere. For example, I will call your attention later to the proposed diversion of the St. Mary River into the head waters of the Milk River, in Montana. That will put into a stream which is now practically dry a volume of water of a thousand or more cubic feet a second, and it will benefit settlers along a course of 500 miles. Now, we can not assess the benefits along those 500 miles, because they are direct and indirect. There are already irrigating ditches there which have been insufficiently supplied, and which would, under the proposed plan, receive an ample supply. Other ditches too would be constructed. In such a case the Government must necessarily build the work as a matter of general benefit, but without any hope of specific returns from the lands to be benefited.

On the other extreme, we have such projects as that of Mr. Newlands, for improving the Humboldt River or the Truckee River, where we can ascertain with a reasonable degree of accuracy the benefit to every acre. There, if in the wisdom of Congress it is decided to obtain reimbursement, it is possible to allot to each particular tract, pro rata, what it ought to pay for the improvement.

Ultimately both of these methods will be adopted in legislation. In the river and harbor bill we must have regulation of many of the streams which flow into navigable waters, which regulation will inure more to the benefit of the settlers than to navigation. On the other hand, we will undoubtedly have, in the sundry civil bill or some similar bill, provisions for constructing reservoirs or regulating works in which the benefits can be levied directly upon the lands; and I have no doubt that the people in those countries would be more than glad to have the Government regulate their rivers and assess, in any way it might, the benefits to be derived.

The proposition of Mr. Newlands, while it is open to a great many objections, is apparently more feasible at the present time than any other. It proposes to devote to the construction of certain regulating works the proceeds which are now covered into the Treasury; and it is in its larger conception an appropriation of money. From a study of the newspaper clippings that have reached me from year to year, I see that the objections that are raised are not those of intelligence, but those of ignorance. We have thousands of little squibs in the papers to the effect that "The farmers of the East will not submit to be taxed to benefit the West," and so on. Now, you can not reason with that class of people. But you can stop them by simply saying, "We do not appropriate directly any money from the Treasury; we simply divert the money which comes from the arid lands and put it back into the arid lands, where it properly belongs; and ultimately all of this money is refunded to the Government."

If we had only the intelligent, thinking, reading class of people to deal with, we could possibly in time educate all to a better conception of these facts. But we are compelled to meet the dead opposition of people who will simply take a catchword, a phrase, and fight a good measure merely in order to be in opposition. Mr. Newlands's general bill has been so worded as to avoid striking on all the snags

which are impeding the progress of the development and reclamation of the arid lands.

If it is possible to create a fund from the balance left over in the Treasury from different funds which may be charged up to the sales of public lands; if that amount should be only half a million dollars, which could be well invested in a few regulation works, and the money turned over, it would not be many years before we would see a substantial improvement all along the line. In this work it is not proposed or desired to reclaim all of the arid lands at once, but to commit the Government to some policy which will enable the ultimate reclamation of all these arid lands.

At present, with the matter not embodied in legislation, the developments are proceeding along lines which are obstructionary. We are allowing men to go in and take up commanding positions, to file upon lands which are of relatively small benefit to them as individuals, but which will block the development of homes and farms for hundreds of additional individuals. For example, I have a clipping from a Denver paper regarding a sale of 160 acres, including water supply controlling 10,000 acres of Government land. Now, under a wise administration of the land laws, it might be possible for 500 families to live where one man has ingeniously taken up his holdings so as to control all the water. His 160 acres are scattered along in forties in such a way as to block access to all the 10,000 acres of public lands around. And if you study the map of the public lands you will see how individuals everywhere are grasping sources of water supply which they will not be able to use themselves; they have not the funds, they have not the ability to develop this water and conserve it; and yet they are in a position to prevent many settlers from making homes.

Now, that feature of the problem should be recognized at an early date; and whether we spend a few hundred thousand or a few million dollars in the next generation, the action should be in such a line that it will not prevent the future utilization of all the seventy-odd million acres which can be reclaimed.

MR. SUTHERLAND. Will you permit a question, Mr. Newell? I think you said the Survey had been conducting a series of surveys for the last twelve years? You have, I presume, practically surveyed a large proportion of this arid land. Are you able to give us an estimate of the cost of the improvements, building of reservoirs, etc., sufficient to save the waters for the land that can be reached?

MR. NEWELL. The estimates which we have been conducting are more along the line of available water supply than of the construction of works. But as far as our information now goes, it is probable that water can be stored for less than \$5 an acre-foot. In some of the estimates which we have here, but 1 acre-foot—that is, 1 foot of water in depth—is devoted to an acre of land. Of course, the cost of reclamation, as far as the storage of water is concerned, would be less than \$5 an acre there. If, however, as in the case of alfalfa, where water is cheap and plenty of it is put on, sometimes as much as 3 or 4 feet, the cost would be proportionately greater. Then there are a great many alternatives as to character of soil, skill of the irrigator, and kind of crop.

MR. REEDER. You say more than 3 or 4 feet of water to an acre are used?

MR. NEWELL. In alfalfa, yes. In southern California and Arizona, where they have upward of five or seven cuttings of alfalfa a year, every cutting may represent a foot or more of water put on the ground.

In other regions, where orchards are irrigated and the water supply is scarce through the whole season, the farmers put on only a depth of two or three inches. They are forced to practice economy.

Mr. WILSON. We do not put a foot upon our orchards, where we have an abundance of water. I had a measuring machine on my orchard and found that to be the fact.

Mr. NEWLANDS. The quantity used for alfalfa diminishes with the length of time for which the land is irrigated, does it not?

Mr. NEWELL. Yes. Of course all of these matters depend upon the skill of the man and the length of time the ground has been watered. Take even the coarse open soils of Utah and Idaho. The first year the settlers put on a depth of water of perhaps 10 feet, or even 20 feet. It all goes down through the soil, which gradually becomes more compact, so that less and less water is required; until now, in some parts of California at least, no water whatever is supplied to the surface of the soil.

Mr. WILSON. Then the cultivation of the orchards has a good deal to do with it—making them conserve the water that is there?

Mr. REEDER. Yes; I run an orchard on that principle, entirely without water, where formerly the trees would not have grown at all without it.

Mr. NEWELL. This survey has been conducted mainly up to the present time along the lines of finding out where the water was, how much there was, and how much could be stored, and we are now trying to get at the cost of storing it and the benefits to be derived from the reclamation of the land. If you desire, I can now take up a few specific localities.

Mr. BARHAM. Just a moment, before you go to that branch of the matter. In your opinion, what will be the cost to the Government of a complete survey, having in view the irrigation of the arid lands of the United States?

Mr. NEWELL. The estimates I have prepared have been on the basis of an expenditure of \$250,000 a year for about five years. The area to be covered, you must recollect, is larger than nearly all of that of the civilized world. Take the area of Europe and it is smaller than the region which we are proposing to investigate.

Mr. BARHAM. In round numbers, the cost of surveys alone would be about how much?

Mr. NEWELL. It is as indefinite as an estimate as to what would be the cost of this city when finished. One thing leads to another. But the essential facts can be ascertained within a few years with an expenditure of about that amount. Of course the expenditure of that amount in learning how the rivers behave when the floods occur, how much they are, what the cost of holding them is, and what would be the benefit to the lands, will be distributed over this vast area, capable of supporting, when developed, a population of, say, 50,000,000. I do not think it is any exaggeration to say that as many or more people can find homes west of the Missouri River than east of it.

Mr. SUTHERLAND. From the preliminary survey which you have made, how many great reservoir sites would you say there are that could be constructed?

Mr. NEWELL. We have found something less than 100 which would be called worthy of consideration. As a rule a man will report that in his county there are a great many good reservoir sites. We go there and examine them. We find, usually, that the open valleys are so greatly inclined that a dam or reservoir 100 feet or so in height will

not back up water to any considerable extent. It is an optical delusion by which a broad valley is apparently level, but it is really highly inclined; so that probably not one out of twenty reservoir sites that are popularly supposed to be good would actually be feasible under the present cost of construction and land values.

When we have a population of 50,000,000 people, and when land values run away up into hundreds of dollars per acre, it will be possible then to construct reservoirs which are now utterly absurd.

Mr. NEWLANDS. In speaking of the number of reservoirs, do not the canals which are constructed really form reservoirs in themselves by saturating the soil and by making underground reservoirs which feed other lands by seepage?

Mr. NEWELL. That is true, of course. But the great primary step is to hold the waters up in the mountains; and then, as the lands are saturated in the valleys, the extension of irrigation takes place naturally.

Mr. NEWLANDS. You will find, in a given stream, that the water will be entirely taken out, and then 10 or 15 miles below you will find the water restored to the stream, by seepage, will you not?

Mr. NEWELL. Yes. So that along the Arkansas River, probably one of the best examples, the water coming down from the mountains is taken out on the plains; then a few miles below the river is seen to increase in volume and another canal comes out. Below that there will be, perhaps, a tight dam, taking out all visible water. Ten miles below there will be quite a stream, and another tight dam taking out all the visible water, and so on—the water tending to creep gradually down toward Kansas. The same is true on the South Platte River, which now is dry for, perhaps, a hundred miles or so above the Nebraska line; but the tendency is for the water to gradually creep down toward Nebraska. With the ultimate development of all the storage reservoirs in Colorado, and with the use of that water to its full extent on the plains, there may be a larger flow at the Kansas and Nebraska lines than there is at the present time.

Mr. BARHAM. Have you made any estimate as to the probable cost of the whole scheme?

Mr. NEWELL. I have not, for the reason that while the Government might, we will say, put \$5 an acre into regulating the water, private capital would then enter in to the extent of three or four times as much in the minor works which would be rendered possible by it—in the same way that \$100,000 in dredging a bar at the mouth of a river would result in the expenditure of millions of dollars in wharves and shipping facilities.

If you care to take the specific localities, I would refer you to eastern Oregon, where we have the Malheur and Owyhee rivers, torrential streams flowing from the mountains through a desert country, and entering the Snake River near the mouth of the Boise and the Payette. Now, on the other side, in Idaho, is some of the best fruit country in the world, and developments are very rapid there. But on the other side, along the Malheur and Owyhee, owing to the torrential character of the streams, agriculture has developed very little. Now, it will be possible, by storage reservoirs in the head waters, to conserve the flow of those streams and make possible a development of the fruit lands in these lower valleys comparable to that of those in the vicinity of Boise and other regions around there. So that a few hundred thousand dollars put into reservoirs on the head waters of these streams would undoubtedly result ultimately in the addition of millions of dollars of taxable property to that end of Oregon. The

same is true, to a less degree, of the Umatilla and other rivers in the eastern portion of the State.

The same thing is true of a portion of the State of Idaho. The Snake River, coming out from the vicinity of the Yellowstone National Park, flows out on a great lava plain, where it could easily be diverted, and then begins to sink into a deep canyon from which the water can not be brought because it is too far beneath the irrigable lands. It is possible to take out several large canals and cover a considerable portion of this desert. The streams which come in from the south can be stored and the water can be taken out on the lands along the stream; and it is possible to develop a considerable area of good land by the regulation of the waters which now run to waste.

For another example let us consider the Truckee Basin in Nevada and in California. Lake Tahoe receives the drainage from a forested area in the Sierra Nevadas. It is formed by the blocking-up of an ancient valley by a great lava flow, and is a natural reservoir. But its waters are not controlled. It lies in such a position that about one-half of the lake is in Nevada, but the outlet is in California. The Nevada people are helpless in attempting to control that lake. Californians have the idea that they can use that lake to supply San Francisco at some time in the future, and they resent any attempt made by the Nevada people to get the waters and carry them over to the east.

Mr. NEWLANDS. In order to utilize that lake for California, it would be necessary to tunnel through an immense intervening ridge, would it not?

Mr. WILSON. It illustrates the wild ideas Californians have generally. [Laughter.]

Mr. MONDELL. How long a tunnel would be required?

Mr. BARHAM. Oh, a tunnel 6 or 7 miles long—a mere bagatelle in California, where we have big trees and big men.

Mr. NEWELL. That stream flows out through a portion of California and is discharged easterly, flowing down into Pyramid Lake and into Winnemucca Lake.

Mr. NEWLANDS. And those two lakes are in the sink or lower part of the desert, are they not?

Mr. NEWELL. Yes. As Mr. Newlands has said before, the existence of those lakes in there shows the amount of water which is useless, which might have been employed in agriculture in these valleys above. There are also a number of relatively small lakes and reservoir sites in California on Truckee River which can be utilized to supply water for the irrigation of those lands.

Mr. NEWLANDS. Now, Mr. Newell, will you bring out the fact that this area of which you are speaking in California is on the Nevada slope of the mountains, and is not toward California, and that it feeds the Nevada streams and not the California streams?

Mr. NEWELL. The summit divide between the watershed flowing to the east and the west would properly form the dividing line between those two States. But in laying out the boundary it was placed over on the east side of the summit or divide, so that it results that every reservoir site which can be used to benefit Nevada is over the line in California.

Mr. NEWLANDS. That is true of three rivers.

Mr. NEWELL. Although that line is an imaginary one, it divides a very active State sentiment in regard to the control of water of those streams.

MR. NEWLANDS. The peculiarity of the California area is that there is no land capable of irrigation on this slope within the California line. It is all mountain land.

MR. NEWELL. The reservoir sites are on one side and the irrigable lands on the other, with the State line between. By a conservation of these waters by reservoirs, the cost of which has been estimated, it will be possible to reclaim thousands of acres of desert land lying out on these valleys—some of the best lands in the United States, lands which have never been washed by the rains. They are full of fertility; and yet, owing to the difficulties of getting water to them, the poor, rocky land in the vicinity of Reno has been used as against the rich, fertile, fine lands of the farther valleys. I do not think in any part of the United States have I seen farms on rockier soil, even up in Maine and Vermont, than some of those around Reno, simply because they could not afford to take the water back to the better soils of the lands in the neighboring deserts.

MR. NEWLANDS. And yet those 30,000 acres of alfalfa sustain a town of 4,500 people. It is almost the main source of the prosperity of the town.

MR. NEWELL. There is no telling what the population might do if they used all the good soil. Now, regulation of this stream, conservation of its flow, would result in the bringing under irrigation of these many thousand acres of land, and bringing in an enormous amount of private capital in the shape of settlers and their effects and their labor in building up a State.

To sum up the whole matter, the following statement may be made:

In the State of Nevada there is the Humboldt, of which Mr. Newlands has spoken, and the estimates are in a fair degree of completion concerning the whole Truckee Basin. They are as follows, as stated in a report by Mr. L. H. Taylor:

Name of reservoir.	Gross capacity.	Net amount which may be annually drawn off.	Cost of dam, rights of way, etc.	Cost per acre-foot.
	<i>Acres-feet.</i>	<i>Acres-feet.</i>		
Lake Tahoe	745,400	250,000	\$21,402	\$0.09
Donner Lake	26,900	26,900	82,672	3.07
Independence Lake	11,750	11,700	31,802	2.72
Webber Lake	10,450	10,400	50,463	4.85
Squaw Creek	1,600	1,600	7,920	4.95
Twin Valley	3,480	3,400	20,125	5.92
Little Truckee No. 1	20,540	20,500	62,215	3.04
Hennes Pass Valley	17,000	16,000	40,365	2.52
Little Truckee No. 2	6,500	6,500	28,750	4.42
Dog Valley	5,785	5,500	17,637	3.10
Little Valley	6,500	6,500	26,708	4.11
Total	855,905	359,009	389,459	1.09

It is feasible to construct storage reservoirs in Sardine Valley, California, and at two points on the main Truckee River between Reno and Wadsworth, but owing to the sites of such reservoirs being traversed by railroads the cost for rights of way, including removal of railroad tracks, would be excessive.

If Lake Tahoe be created into a storage reservoir with the gross capacity of 745,400 acre-feet above ultimate low-water plane, so as to store the waters of wet years for use during the dry years, it will be feasible to draw therefrom 250,000 acre-feet annually.

The watersheds tributary to the other reservoirs named yield sufficient water, even in seasons of minimum precipitation, to fill each of them, with the possible exception of the Henness Pass Valley reservoir.

The waters stored in the reservoirs named, if employed to supplement the ordinary flow of the Truckee River, and used with moderate economy, are sufficient, even in the driest years, to irrigate 187,616 acres of land in excess of what is now watered, or a total of 230,000 acres, leaving a surplus of 79,000 acre-feet for safety, besides maintaining the flow of the Truckee River at the minimum of 300 cubic feet per second above the town of Reno, to afford a supply for power and other purposes.

It is feasible to construct an irrigating canal with a capacity of 550 cubic feet per second from the Truckee River at a point near Floriston, in California, to supply 75,000 acres of good arable lands above and to the north and northeastward from Reno, at a cost, for diversion canal and headworks and the main branches and distributaries, of \$750,000.

It is feasible to construct a canal on the south side of the Truckee River, from a point above Clarks Station, having a capacity of 750 cubic feet per second, to a point a short distance above Wadsworth, where a branch with 225 second-feet capacity can be taken across the river by pressure pipes and led northward toward Pyramid Lake, while the main branch, with a capacity of 525 second-feet, can be continued on to the southeast and eastward from Wadsworth, the two branches supplying water to 99,000 acres of land, of which about 30,000 acres are in the Truckee River Basin (over 20,000 being in the Pyramid Lake Indian Reservation and 69,000 acres in the basin of the Carson River, approximately 50,000 of which are in Carson Sink Valley), and that the cost of this canal system, including the principal distributing branches, will be about \$4 for each acre commanded, or \$396,000.

The entire upper portion of the Truckee River Basin, embracing all of the drainage area above the town of Verdi and the north and east timbered slopes of the Tahoe range of mountains, should be set aside as a forest and water reserve or a national park, and the waters be forever dedicated for use for industrial and irrigation purposes within the basin and upon such lands immediately adjacent as they may supply.

The Lake Tahoe dam should be built as the first step in the storage of water upon the Truckee, and all private rights in the other reservoir sites mentioned should be acquired by the Federal Government, so that when the time for their utilization arrives there will be no obstacle to their construction.

The portion of the public domain which can be irrigated from the stored waters of the Truckee River should be withdrawn from entry, and after being provided with a system of canals for the delivery of water should be offered for sale at a price commensurate with their value as irrigable lands with water rights. The irrigated and irrigable lands should be embraced in a Federal irrigation district, and the water rights for lands held in private ownership, outside of such as are now irrigated, should be sold at the same price as is charged for the public lands with water. All moneys derived from the sale of lands and water rights, and from their sources to be devoted, first, to the reimbursement of the cost of reservoirs and canals, and, second, to the maintenance and improvement of the irrigation system and to

defraying the expense of administration. All power privileges not already appropriated should be appraised and disposed of at a reasonable valuation, and the benefits to present users of the waters of the Truckee River for power purposes arising from the increased and more steady discharge due to storage should be assessed and paid for by such users.

Surveys have also been made on the Humboldt and Truckee rivers. On Rock Creek, a tributary of Humboldt River, a dam can be built storing 80,000 acre-feet, and costing \$62,300, as described in the Twentieth Annual Report of the United States Geological Survey, Part IV, page 445. On the Lower Humboldt River a series of reservoirs can be built at an estimated cost of \$148,300, storing 55,000 acre-feet, and, with the flow of the river, irrigating 60,000 acres.

In Arizona detailed surveys have been made on Gila River, the results having been published in Paper No. 33 of the series of Water-Supply and Irrigation Papers of the United States Geological Survey. The most feasible reservoir is that on the San Carlos Apache Indian Reservation. The capacity of this reservoir will be 241,396 acre-feet and the cost \$1,038,926.

In California detailed surveys have been recently made of a number of reservoirs, principally in the high sierras. One of these is in the Hetchy Hetchy Valley; it is described in the Twenty-first Annual Report of the United States Geological Survey, pages 450 to 465. The total cost of the dam and accessories will be \$607,057, storing 107,000 acre-feet, at a cost of \$5.67 per acre-foot.

In addition, a number of surveys have been made in cooperation with the California Water and Forest Association, the results of which are shown in Senate Document No. 59 of the Fifty-sixth Congress, second session. The most important is the Clarks Valley reservoir, storing 223,224 acre-feet, at a cost, for the dams, of \$1,311,842. In order to fill the reservoir, it will be necessary to construct a diversion conduit from King River with a tunnel, the total cost of works and the dams being \$2,013,949, or at a rate of \$9.02 per acre-foot stored.

In Montana surveys have been made to ascertain the feasibility of diverting St. Mary River into the head waters of Milk River. This project has been found not to offer unusual engineering difficulties. The cost of the most favorable, the most difficult part of the route, has been estimated to be \$325,000.

In Wyoming the reservoir site on Grey Bull River, storing 14,204 acre-feet, will cost, for construction of dam, \$49,962.

These facts are given in concise form in the following summary:

Cost of projects for which surveys have been made.

State.	Reservoir.	Capacity.	Total cost.	Cost per acre-foot.
		<i>Acre-feet.</i>		
Arizona	San Carlos	241,396	\$1,038,926	\$4.30
California	Hetch Hetchy	107,000	607,057	5.67
	Clarks Valley	223,224	2,013,949	9.02
	Enlargement	216,000	1,277,500	5.91
	Stony Creek	39,650	387,400	7.25
	Clear Lake	80,000	452,484	5.66
			\$2,000,000	
Nevada	Rock Creek	80,000	62,300	.78
	Lower Humboldt	55,000	148,300	2.70
	Truckee	359,000	389,195	1.08
Wyoming	Grey Bull	14,204	49,962	3.52
Total		1,415,474	6,327,337	4.47

**STATEMENT OF GEORGE H. MAXWELL, OF SAN FRANCISCO, CAL.,
CHAIRMAN OF THE EXECUTIVE COMMITTEE OF THE NATIONAL
IRRIGATION ASSOCIATION.**

Mr. MAXWELL. Mr. Chairman and gentlemen of the committee: I hardly know to what particular point to address myself.

Mr. NEWLANDS. Our inquiry, Mr. Maxwell, has been directed so far to two bills—the Humboldt River bill, in Nevada, which you have seen, and a general bill. The latter provides for the setting apart of all moneys received from the sales of public lands in the arid and semi-arid States to a special fund in the Treasury, to be called the “arid-lands reclamation fund.” It is then provided that the Secretary of the Interior, with the aid of the Geological Survey, shall go on and survey and complete projects to withdraw the lands subject to a given scheme from general entry, and provision is made for the entry under this law in areas not exceeding 80 acres for each entryman, and for the imposition of the cost of the water right proportionately upon every acre of the land benefited. It is provided that the moneys shall be paid in ten annual installments, which are to go back into this reclamation fund, thus creating a revolving reclamation fund. Those are the two bills which have been under consideration. The general subject has also been under discussion.

Mr. MAXWELL. Taking up the last bill first, Mr. Chairman, it seems to me that the bill for the creation of this arid-land reclamation fund has a great merit, from this point of view:

I have followed for a number of years past the objections which have been raised from time to time in the editorial columns of some of the papers in the East and by some of the Eastern Senators in discussions on the floor of the Senate; and I observe that they have objected to the East being taxed for the benefit of the West, taking the view that the expenditure of the moneys of the National Government for the development of the West by irrigation was a measure entirely for the benefit of the West.

The bill to which Mr. Newlands refers, and a copy of which I have seen, seems to me to obviate the objection that the East would be taxed for the benefit of the West. In other words, as I understand the measure, it is not proposed to put any burden at all upon the Eastern taxpayer. The proposition is merely that the proceeds of the sales of lands in the arid region shall be used to create a fund for the gradual reclamation of the arid region; that wherever moneys are invested in construction the lands shall be sold for a sufficient price to cover the cost of construction, and that the price, when paid, shall be returned into the fund, so that the fund would be gradually increasing from year to year. In the working out of the plan all moneys temporarily withdrawn would be gradually returned to the Treasury.

I apprehend that there is no ground for a contrary argument to the proposition that there are many locations in the West where the Government can undoubtedly build an irrigation system, or at least the large main-line canals and reservoirs, and dispose of the land for a sufficient sum to entirely cover the cost of construction. On the other hand, there are undoubtedly many millions of acres of Government land which it is not feasible to undertake to reclaim under that plan, for the reason that it is almost impossible for the Government to so control the water supplies which would be created by storage as to limit their use to any specific area of Government land. I mention

that fact in order that my position may be well understood—that while this proposed measure of Mr. Newlands is, in my judgment, one that has great merit, and would in many localities solve difficulties which are otherwise unsolvable, and is a measure to which, it seems to me, no reasonable objection can be made from any quarter of the United States, at the same time it can not be considered as a complete solution of the whole problem. I might illustrate, in order that my idea may be made plain, as I pass along the conditions in Wyoming and Nebraska, or Colorado and Arkansas. There are, no doubt, very large areas of land in those States which could be irrigated from reservoirs in the Rocky Mountains, which the Federal Government will have to construct if they ever are constructed, which could not be reclaimed under the plan proposed in Mr. Newlands's bill, for the reason that the reservoir—the head of supply—is so remote from the place where the waters would be used that it would be an impossibility to connect the two and sell the land which that particular water supply would irrigate for sufficient money to pay for building the reservoir. In other words, some other plan must be devised for covering that branch of the subject.

But coming back to Mr. Newlands's bill. There is no doubt that as to large areas of country, more particularly in the Southwest—I have mentioned several locations in Nevada, in Arizona, and in southern California—it is a perfectly feasible and sound proposition. I believe to-day that some measure of that kind is the only solution of the reclamation of the Territory of Arizona. Now, there is a Territory which is as large as the whole Philippine Archipelago, and it will, beyond question, support as large a population as the Philippine Islands, provided that all the water which to-day runs to waste can be saved and utilized.

There is a measure pending in the Senate providing for the construction of a reservoir on the Gila River. Now, the investigations of that stream have shown, and the engineer's report, that only 3 per cent of the total flow of that river is to-day utilized or available for use. You can imagine what the conditions would be if the area irrigated and the population sustained by irrigation from the Gila River were increased 97 per cent.

There is a location which this bill of Mr. Newlands would exactly fit, because the Government controls the water supply and the reservoir sites. It can specifically designate the land that that water shall be used upon. It can put the land upon the market in small tracts and sell it, with the water right, for more money than all the irrigation works will cost. I find that in the discussion of these subjects the difficulties that arise come, nine times out of ten, from the fact that some one has taken a mere broad generalization of the subject without getting down to specific propositions—I wish not to diverge, but to call attention in passing, to an objection that was made in the Senate yesterday. Senator Platt of Connecticut and Senator Quarles of Wisconsin both raised the objection to this specific proposition on the ground that a general or comprehensive plan should be brought in for consideration.

No man alive to-day will see this problem solved if we are obliged to wait before we do anything until we can create a comprehensive scheme of national irrigation which will be sufficiently flexible to fit every locality and suit every objection. We must begin with localities. I apprehend that one reason why I have been led to study these different phases of the problem perhaps more than others lies in the

very fact that California, my native State, possesses such diversified conditions that what fits one part of the State will not fit another.

Mr. SUTHERLAND. Pardon me just one moment. I live in Nebraska. What suggestions have you for western Nebraska and eastern Wyoming?

Mr. MAXWELL. Confining it to western Nebraska, first, artesian wells; second, the storage of the flood waters of the streams until they are absolutely controlled and regulated for use. In other words, when the Government builds storage reservoirs in Montana and Wyoming, it can not undertake to distribute that water to specific localities. They must be turned into streams and left to be taken care of by the irrigators during their entire course.

Mr. BARHAM. Now, Mr. Maxwell, this point of objection has suggested itself to my mind to the proposition made by Mr. Newlands of selling the land at so much an acre—

Mr. NEWLANDS. Pardon me, selling the land simply at the proportionate cost of the project.

Mr. BARHAM. Well, say \$10 an acre.

Mr. NEWLANDS. It would run from \$5 to \$10 an acre, to be paid in ten annual installments.

Mr. BARHAM. Now that, of course, is only applicable to the sale of lands belonging to the United States, but you must recollect that the point is going to be made that under the scheme proposed by Mr. Newlands the State lands, the school lands, the university lands, the lands now held in private ownership, and the railroad lands (which lie in every alternate section on either side of the line of the railroad, I believe 20 miles on each side, constituting an immense volume of land) are going to be benefited without any compensation to the Treasury for carrying out this scheme.

My suggestion is, instead of the plan proposed here, why not simply take the proposition as it presents itself boldly, and take money out of the Treasury of the United States to carry on this plan, and then assess the owners of these lands (railroads and everybody else) 75 cents or \$1 an acre until all the fund is returned to the Treasury of the United States?

Mr. NEWLANDS. This bill provides that, as to lands now in private ownership, water rights can be acquired by paying the same amount that the entryman of public lands pays, and in the same annual installments—provided there is enough water to go around, the public lands being served first. It also provides that no water right shall be granted to any man for more than 80 acres—thus compelling the railroads and other large holders to divide up their lands for actual settlers.

Mr. MAXWELL. I understood that that point had been covered by the bill. That is one of the most important points.

Mr. BARHAM. Yes; that point is going to be raised all along the line.

Mr. MAXWELL. I am glad you suggested it here, because it is one that is coming up and one that it is difficult to provide for; there is no question about that. At the same time, it has always seemed to me that the argument that by any possibility some private lands might be benefited by the Government construction of irrigation works could not be allowed to hold back a great national improvement, any more than the argument that, for instance, building the San Pedro Harbor or the Eureka Harbor might benefit private properties in the States

where they are located, should be a reason for saying "You shall not build the harbor!"

MR. MONDELL. Is it not a fact that oftentimes a harbor improvement which is a charge against the Treasury, and in return for which the Government receives no direct benefit or revenue, inures to the benefit of individuals owning wharfage property to the extent of millions of dollars?

MR. WILSON. The cleaning out of the Buttermilk Channel is a notable instance of that principle.

MR. MONDELL. Yes; a very notable instance, where, undoubtedly, millions upon millions will be added to the value of private property without any thought of return.

MR. MAXWELL. But it seems to me that the suggestion made by Judge Barham, which, as I understand, is incorporated in this bill, covers that proposition under this plan of development.

MR. NEWLANDS. I want to state further, Judge Barham, that, as a general rule, I think the railroad has parted with all its lands within reach of the stream that are capable of irrigation.

MR. BARHAM. At the same time, we can not put money into the Treasury from the sale of those lands, because they are already sold; they belong to the railroad.

MR. MAXWELL. But you will observe, gentlemen, that the bill provides for returning to the Treasury the money from the sale of the right to the use of the water, and not necessarily from the sale of the land. If it is to be taken up by homestead entry the land itself would go free to the entryman, but the value is in the water; and that feature of it, it seems to me, is covered in that point.

MR. NEWLANDS. By the way, Mr. Maxwell, Judge Barham made this suggestion to me before you came in. He insists upon it that it would be better to face the question boldly, to ask from the General Government adequate appropriations for this work from year to year as a legitimate Government work. Now, my answer to him was that of course I favored that proposition, but that the purpose of this bill was to remove the objections of ignorance.

MR. MAXWELL. There is one suggestion upon that point that I would like to make, and that is this: The objection is frequently made on the part of the East that measures of this kind will result in an abnormal and sudden development of the West, and that they will put things out of balance and perhaps be to the detriment of the Eastern agricultural interests.

I believe that the construction of a few of these irrigation systems will be such a complete demonstration of the unsoundness of that view, that if we could get started upon a perfectly just basis of taking only the proceeds of the sales of arid lands and building these systems, it will be seen that the results are so different from what some of the opponents of the idea have contended that they will withdraw their opposition. I will try to make that clear by an illustration, taking the case of the San Carlos reservoir in Arizona. If the House assents to the measure passed by the Senate, that reservoir will be built in Arizona. The result will be that an area of 100,000 acres of land will be subdivided into small farms, probably 20-acre farms, with an ample supply of water. The people who will go on those farms will produce fruits (deciduous and possibly citrus), raisins, poultry, eggs, and butter. They will not raise stock to any considerable extent, because the land is too valuable to be devoted to that purpose. The result of the development will be that the products of those farms

will be so different from the products of Eastern agriculture that there will be no possibility of any competition with Eastern agriculture. On the other hand, Eastern agriculture will be benefited, because every home that is built in the Gila Valley, in Arizona, is a market for the manufacturer of the East.

I was in Boston within the last week and made an address at a banquet of the Boston Merchants' Club. I called their attention to that unfortunate misunderstanding of this project on the part of some people of the East. From Albany to Boston and from Boston back to New York the railroad is simply lined with the great factories which produce the products that are consumed in the West. The mallet that drives the farmer's post in the ground, the wire on the fence, the plow that tills his ground, the wagon that hauls his implements, the nails in his house, the glass in the windows, the screws in the doors, the clothes on his back—everything the man who goes into Arizona on any of that reclaimed land uses is to be furnished to him by the Eastern manufacturer.

The CHAIRMAN. And you might have gone on and named the spade that digs his grave, and the hearse that takes his body to it, and the coffin that incloses him. [Laughter.]

Mr. MAXWELL. Yes; and I might have gone further than that, and said that the swaddling clothes that wrap the children when they are born there will come from the East.

What is the result of all that? What is the best market for the Eastern farmer to-day? It is in the factories of the East. Take the factories out of New England, New York, and Pennsylvania to-day and the Eastern agriculturist of those States might just as well pack his blankets and take to the road. Every new home that is built in the West, whether it is from the British Columbian line to the Mexican line or from the ninety-eighth meridian to the Pacific Ocean—I do not care where it is—is a positive, absolute advantage to the Eastern agriculturist. There is no getting away from the argument.

Mr. BARHAM. My point is that if we make the people understand that fact they will be only too anxious to join us in going into this broad, comprehensive scheme.

Mr. MAXWELL. That is my idea, Judge; and I think that if we can do it some plan can be reported out of this committee so that it can be discussed with the people. I believe Mr. Newlands's bill has this merit—that while it is not a complete solution of the problem, it is a measure which will be less objected to by the people of the East than any other. I believe that if it is enacted and put into force the benefit to the commercial interests of the whole country and to the Eastern agriculturist will be demonstrated by actual experience under it in such a manner that when we come before Congress with a plan and estimate for a great system of work which has been carefully surveyed, planned, and estimated upon by the Geological Survey, and say to the people of the East, "Now, there is a great tract of land which can be reclaimed, but which requires work costing too much money to be built under this bill; we want more money to go into that fund, to enlarge the revolving fund," it will not be opposed.

Mr. BARHAM. To how large an extent does the title to the arid lands which are capable of irrigation still remain in the Government?

Mr. MAXWELL. The estimates differ. The estimate of the Secretary of the Interior, in his last annual report, was 74,000,000 acres. The estimate of Major Powell, when he was the Director of the Geological Survey, was 100,000,000 acres. I am very glad you called attention

to that point, because I want to state something which, in my opinion, is one of the most important features of this whole movement, and one that is very rarely referred to. That is, that after water is taken out and used for the irrigation of a specific area of land, the country gradually becomes saturated with water, and surface irrigation to a very large extent becomes unnecessary; and the same surface supply will go on and on and on enlarging the area under irrigation until the whole condition of the country has been completely transformed.

Mr. BARRHAM. Yes; there is no doubt about that.

Mr. MAXWELL. There is no man in California who stands higher in the estimation of the people, or who has a closer knowledge of the San Joaquin Valley, than Dr. Chester H. Rowell, of Fresno. I drove through the Fresno colonies with Dr. Rowell, and we were talking on this subject, and he called my attention to farm after farm where there was no surface irrigation whatever.

Mr. NEWLANDS. This was land that had been previously desert land, was it not?

Mr. MAXWELL. Land which had previously been absolutely desert land. It is a well-known fact that the country where Fresno stands to-day was originally a desert, arid waste, where sheep had to scramble for a living in a good year, and cattle and sheep starved in a dry year. To-day there are thousands of acres of land there where the problem is not one of irrigation, but one of drainage; and there is seriously agitated in the San Joaquin Valley to-day the question of the construction of a great drainage canal to drain off the irrigating water. In the city of Tulare, when the white people first went in there, the water table was 75 to 100 feet below the surface of the ground. To-day you can not pump a well dry; you can not pump it down a foot. When you get down 10 or 15 feet the whole country has become a great sponge.

What is the inference from those facts? Suppose we have to-day water enough to irrigate 74,000,000 acres of land. If all the water available is utilized, I believe that in less than fifty years you will have 150,000,000 acres irrigated. The proposition is not a chimerical one at all; it is simply a fact that in course of time the whole country becomes a great sponge.

Taking up this question of reservoirs, I will give you a most remarkable illustration. When I was in Arizona last December I was shown photographs of a peach orchard and a peach crop which was raised without one drop of summer irrigation; they had winter-irrigated it with 8 feet of water. That means that there was put on the orchard an amount of water in the winter season which would have stood eight feet above the ground if it had all been there at one time.

Mr. NEWLANDS. That was during the period of floods?

Mr. MAXWELL. Yes; they put it in in the period of flood. In other words, if they had built a fence 8 feet high all around that land, the water would have filled it up to the top, and would have sunk right down into the ground. That can not be done except in very porous land, where the subsoil is open, so that the water will go down and go out. But they had 8 feet of water on that orchard, and not a drop of summer irrigation; and they had a magnificent crop of peaches.

To illustrate again: The largest single reservoir in Arizona will hold in the neighborhood of 800,000 acre-feet of water. That means that if you could use the whole storage capacity it would cover 100,000 acres of land with winter irrigation 8 feet in depth. When you have 1,000,000

acres of Government land under that reservoir, it is perfectly easy to see that by building canals you could take the whole flood supply of the river out and sink it into the land. You can not fill the land in one year; you would never know the water had been put on the tract; but keep on doing this year after year, and in fifty years you will get the whole country full of water. When water goes down into the soil it does not stay there. It does not go through to the other side of the earth, nor does it drop down in the center. It keeps coming out. The consequence is that when the country fills up with water in that way the rivers are replenished, and there is a steady stream flowing in the dry season from the seepage from this underground supply created by filling up this arid land with water.

Mr. NEWLANDS. I quite agree with you that this plan may be not operative with reference to some of these great enterprises where the land is far away from the storage to be accomplished. But in that event the Government could recompense itself by charging a higher price for the Government land. This plan might not be practicable to parts of California. Take the King River, for instance, where they have been suffering greatly in the San Joaquin Valley by reason of the scarcity of water during July and August. Suppose the Geological Survey should project a reservoir on King River, and we will assume that all the land below, in the San Joaquin Valley, except a very small portion, is in private occupancy. There is not enough public land to pay for that enterprise. Do you not think that the people would come forward with some proposition and say, "We will purchase so many water rights, and pay for them at the rate of a dollar per annum for ten years, if you will go on with the work;" and in that way, even though a large portion of the land is in private occupancy, you would secure the fund that would be necessary for the work?

Mr. BARHAM. Wait for the returns to come in in regard to all these different projects; and as they are returned, let them be taken up as they come in year after year?

Mr. WILSON. I move that Mr. Maxwell be requested to extend his remarks in the Record.

(The motion was seconded and unanimously carried.)

Thereupon, at 12.05 o'clock p. m., the committee adjourned until Thursday, January 31, 1901, at 10 o'clock a. m.

WASHINGTON, D. C., *January 31, 1901.*

The committee met, pursuant to adjournment, Hon. John A. Barham (acting chairman) in the chair.

Mr. BARHAM. I understand that it is the order of the committee that we should proceed with the hearing and that a quorum should be considered as present. If there is anyone who can enlighten us upon this subject, we will be glad to hear them.

STATEMENT OF NELSON H. DARTON, GEOLOGIST, UNITED STATES GEOLOGICAL SURVEY.

Mr. DARTON. I have spent several years in making a study of the underground water supply of the arid portion of the Central Plains region. The investigation has been conducted as a portion of the work of the United States Geological Survey.

Mr. REEDER. You spent considerable time, I believe, last autumn in northwest Kansas?

Mr. DARTON. Yes, sir; and in the adjoining portions of Colorado and Nebraska, studying this problem of underground water supply and ascertaining what had been done in the way of sinking wells. The great Central Plains are underlain throughout their entire extent by a vast sheet of Dakota sandstone, which appears to be full of water everywhere. This sheet of sandstone is upturned under the flanks of the Rocky Mountains, where the water goes into the sandstone. This sheet has always been found full of water and to yield great flow to wells which have been sunk into it. It extends under the Great Plains, all the way across, eastward from the flanks of the Rocky Mountains, the Bighorn Mountains, and the Black Hills. On the flanks of these mountains a great volume of water sinks underground into the sandstone, and wherever wells are sunk sufficiently deep to reach this sandstone it yields an abundant water supply.

Mr. REEDER. You say that the principal wells to this formation are north of the district I represent in Kansas?

Mr. DARTON. Yes, sir.

Mr. REEDER. Have you examined the conditions in the district which I represent?

Mr. DARTON. We have, as far as the south line of Kansas and Colorado.

Mr. REEDER. Do you find this same sandstone in the same relations there?

Mr. DARTON. Yes, sir; the same.

Mr. REEDER. How have you determined it, so far as Kansas is concerned; by boring down to the water?

Mr. DARTON. Yes, sir; many of the wells have penetrated to the sandstone. Besides, there is a surface outcrop of it extending across the central portion of the State. There can be no doubt but that this sandstone passes under the Great Plains as a continuous sheet. There is, however, no way to demonstrate the water conditions under those sections which have not had deep wells driven in them, except to bore experimental wells. In the Arkansas Valley, in eastern Colorado, and at the western margin of Kansas many wells have been sunk, and they have yielded the same abundant flow of water everywhere. Out Northwest, in Dakota, many wells are producing an enormous amount of water from the same bed of sandstone. In portions of eastern Nebraska, where the sandstone is near the surface, there are innumerable wells which furnish an abundant water supply.

Mr. REEDER. Do they furnish a sufficient amount of water to be of value for farming purposes?

Mr. DARTON. In some cases, in South Dakota, they furnish enough for the irrigation of a whole section of land from one well. There are single wells there that flow nearly 4,000 gallons of water a minute, and that is sufficient to much more than irrigate a square mile of land. The water flows out over the surface, and except on the very highest land, is under considerable pressure. There is, however, a large area in western Nebraska, western Kansas, and in a portion of eastern Colorado which has not been explored underground. In many places wells have been sunk to a depth of 1,000 feet and they have obtained a small water supply, but not penetrated deep enough to reach the Dakota sandstone, or at least to thoroughly test its resources as a water bearer. There is a region in northwestern Kansas, the Oberlin region, where the top of the sandstone appears to have been reached

at a depth of 1,000 feet. It yielded a flow of water which is too saline for use, but it is believed that penetrating further into the sandstone at that place there will be obtained water of a better quality. Usually the water is of an excellent quality.

Mr. REEDER. That is why I was inquiring whether there had been any observations made that would show that this water-bearing sandstone crosses Kansas and Nebraska, and you say that as it has been found farther south, it is reasonable to suppose that it underlies all of the western portion of Kansas; but absolutely there is no way to know about this except to bore.

Mr. DARTON. That is the only way to find out whether it would furnish a flow of water of good quality. The plan is now to sink wells to thoroughly test the amount of water, its head, so as to ascertain where it will give surface flow, and its character; that is to say its suitability for domestic purposes, and for stock, etc. A certain number of wells sunk at wide intervals through the Central Plains region would give us most valuable information as to the conditions over a very wide area now greatly in need of suitable water supplies.

The precise area to which I refer is the western half of the State of Nebraska, the western half of Kansas, the eastern half of Colorado, the southwestern corner of South Dakota, and the southeastern corner of Wyoming. That is the area to which our investigation applies, and the one in which we believe experimental wells will throw a great light on the general water-supply problem. There are many points in this area in which wells may be expected to be successful and by their success give encouragement to individuals to sink wells.

The CHAIRMAN. What is the cost of sinking a well and preparing it for irrigation, a thousand feet deep?

Mr. DARTON. Three or four thousand dollars, ordinarily; that is, under favorable conditions.

Mr. REEDER. The borings already made indicate that in the section of Kansas I represent wells 1,000 feet deep would not be sufficient, but do you not think that wells 2,000 feet deep would test the matter thoroughly?

The CHAIRMAN. What would they cost?

Mr. DARTON. Ten thousand dollars would pay for a properly constructed deep well.

Mr. NEWLANDS. Assuming a well 2,000 feet deep would cost \$10,000, would there be a sufficient return from the water to warrant that expenditure?

Mr. DARTON. The water itself from such a well ought to be of value sufficient to compensate for its expense, but then the light it is to throw on the underground relations and position of the Dakota sandstone and its water contents would be the principal feature of the experiment.

The CHAIRMAN. How much would such a well irrigate?

Mr. DARTON. It is extremely difficult to tell, for we can not predict in advance how much flow will be obtained.

Mr. REEDER. You state that some of these wells in southern Dakota are capable of irrigating a whole section of land, but we do not know that it will be that much in Kansas, and what we want to know is whether it will justify our people, as private individuals, in going to that expense.

Mr. PHILLIPS. We can tell by putting down a well.

The CHAIRMAN. You say one well in eastern South Dakota will irrigate a square mile of land?

Mr. DARTON. Yes, sir; under favorable conditions.

Mr. NEWLANDS. In South Dakota, where these wells have been developed, how many wells are there, and what area of land is irrigated by them?

Mr. DARTON. I have returns from about 300 deep wells in southeastern Dakota, and the number of quarter sections irrigated there now is about 100.

Mr. NEWLANDS. Do you know what the average cost of those wells has been?

Mr. DARTON. Two thousand five hundred dollars, on the average, or possibly \$3,000. The conditions are very favorable in that section.

Mr. NEWLANDS. What kind of wells are sunk there?

Mr. DARTON. Various kinds. In many cases the wells are shallow, but the number of very deep wells is about 120.

Mr. REEDER. What do you mean by very deep?

Mr. DARTON. Fourteen to sixteen hundred feet deep. On some of the higher lands they are deeper.

Mr. NEWLANDS. Is it your opinion that the Dakota sandstone formation continues through western Kansas, and Nebraska and Colorado?

Mr. DARTON. Yes, sir; there seems to be no doubt about it; we see it upturned against the Rocky Mountains in Colorado, and outcropping in portions of the Arkansas Valley, and it has been penetrated by many wells in the Arkansas Valley. In central Kansas it has been reached by a number of shallow wells.

Mr. REEDER. It has been observed on four sides of the territory we are talking about.

Mr. DARTON. Exactly.

The CHAIRMAN. Now, in the wells where experimentation has been made and proved successful among the farmers they have been extremely useful?

Mr. DARTON. Yes, sir. Their greatest usefulness has been the supply of water for stock; but, as before stated, they have been used in eastern South Dakota for irrigation, and their great pressure also furnishes power to run electric-light plants, flouring mills, etc. The wells in the Arkansas Valley which reach the sandstone and furnish large volumes of water are used not only for local water supply but to supply small towns. The water of the Arkansas River is not agreeable to use, and the smaller sources of water supply—springs, etc.—are not adequate, so these artesian wells have been sunk and furnish a fine supply from the sandstone; now nearly every little town in the Arkansas Valley, in eastern Colorado, has an artesian well as a source of water supply.

We are not altogether certain as to the depth to the Dakota sandstone in all portions of the Central Plains region. There is a mass of overlying clays of 1,500 feet and more in some places, and there is an extensive area in which no wells have been sunk sufficiently deep to penetrate these clays and reach the Dakota sandstone. Many wells have been sunk to a moderate depth, but have found the clay so difficult to penetrate that boring operations have been discontinued on account of the expense and uncertainties. If wells could be sunk through the clays to the Dakota sandstone and a water supply obtained, it would encourage many persons to sink wells all over this region for themselves. You can not expect them to sink these wells without feeling certain that they will get a water supply.

Mr. BARHAM. Wherever these wells have been sunk is there any danger of the water being exhausted? I have heard that wells some-

times are exhausted and give out in a short time and that the well proposition was a failure.

Mr. DARTON. That has not proved to be the case in southwestern Dakota, where there are many wells together in a small area. In the vicinity of Denver, Colorado, where there is a local artesian basin, the water now has to be pumped and has ceased to flow spontaneously. It has happened there, but the cause of it is the small size of that artesian basin.

Mr. BARHAM. Is it only in an artesian basin that you get artesian water?

Mr. DARTON. Yes, sir. Where you get flowing water there has to be an elevated source for it on one side at least.

Mr. BARHAM. And in this Central Plains region you are talking about now, is it not artesian water?

Mr. DARTON. Yes, sir, it is; that is, it is water under great pressure, which causes it to rise above the surface or toward the surface.

Mr. SUTHERLAND. What do you mean by a small basin in and around Denver; wherein does that differ from the general area of which you have been speaking?

Mr. DARTON. It is a sandstone basin of small area. It has a small catchment area, and some of the water is free to escape, so that it does not carry a large volume of water, whereas this Dakota sandstone underlying, as a continuous sheet, the whole of the vast Plains region, catches and holds the water in immense volume and under pressure given by the elevated source to the west.

Mr. SUTHERLAND. Then the conditions under the Central Plains differ from the local conditions at Denver?

Mr. DARTON. Yes, sir. I mention the Denver waters simply in reply to Mr. Barham's question as to whether there is any area in which the artesian water is giving out. This has nothing to do with the broad problem of the Dakota sandstone.

Mr. BARHAM. That is what I am getting at. In the interior they have not found any diminution of the inflow.

Mr. DARTON. They have in some instances found that the flow was diminished, but that has been because the wells have become choked up with sand, or some other defect in the well; and new wells in the same vicinity always flow.

Mr. REEDER. It seems to me the flow would become stronger rather than weaker, with the sinking of wells, for the reason that if you diminish the surface flow to the east there would be a tendency to clog up the sandstone with deposit. If you have the outlets shut up somewhere, the water would rise higher in the wells. Now the outlets at the eastern end are being kept open by the pressure of the outflowing water. This permits the water level to fall to a lower altitude than that which it would have if the openings in the sandstone at the eastern end were stopped up. The water goes under ground at an altitude of 6,000 feet, and to the eastward; where the Dakota sandstone outcrops to the surface at much lower altitudes the water escapes through innumerable springs, and we have this leakage.

The CHAIRMAN. Why does that leakage diminish the pressure to the west?

Mr. REEDER. Because the water flows too freely to sustain the pressure. By the opening of wells through this country the water would have a greater vent by openings to the surface which would tend to maintain its flow nearer its source, and would not this make less pressure at the lower end?

Mr. DARTON. Yes, sir; if there were openings to the west there

would be diminished pressure or volume of outflow along the eastern outcrops.

The CHAIRMAN. And the more pressure you have here along the outflow zone the more likely it is to be open and free there?

Mr. DARTON. Yes, sir; the volume of outflow would naturally be greater.

Mr. NEWLANDS. Do you know what the source of the water is in the Dakota sandstone? Does it come from a stream?

Mr. DARTON. No, sir; it is mainly from the rainfall in the outcrop zone of the Dakota sandstone, which is 8 or 10 or 15 miles wide. The surface is very porous and the rain sinks into it. It is also well known that many of the streams crossing the outcrop zone lose more or less of their water, which sinks into the porous sandstone.

Mr. REEDER. I want to get at these points. You have looked into this matter thoroughly enough to know that this sandstone underlies all of western Kansas and Nebraska. There is no way for us to know whether the water from this sandstone can be brought to the surface without actually trying and making an experiment. Such an experiment is so expensive that individuals can not afford it. That is the point I wish to get before this committee, that this is merely a proposition to make such experiments as will show whether it is possible for us to obtain water supplies for this vast territory by this means. We are asking in bills H. R. 13242, etc., \$25,000 to make that experiment.

Mr. DARTON. The test wells are to obtain information and not water.

Mr. REEDER. It is to obtain information and not water. Our people will obtain the water if it can be demonstrated that it is there for us to obtain. That is my only point in the matter.

The CHAIRMAN. In how many States in the United States do you think artesian wells could be obtained successfully?

Mr. DARTON. There are many. We know of numerous artesian basins scattered widely over the United States. But I have not studied in detail that question outside of the region of the Central Plains.

Mr. REEDER. In most of these regions that you speak of, has not the discovery of artesian water been made by actual borings and finding the water, so that they have passed the stage we are at now?

Mr. DARTON. Yes, sir.

Mr. REEDER. There is no great region that indicates in this way that the water is there, except this region, which has not been so tested?

Mr. DARTON. Not so far as I know.

Mr. SUTHERLAND. Observing Montana, Idaho, Wyoming, and Washington, what do you say of the possibilities of artesian basins in those States?

Mr. DARTON. There are artesian basins in those States, but they are outside of the area assigned to me for investigation. I have devoted myself entirely to the Central Plains region for the last three or four years, and feel competent to speak of that area only.

Mr. REEDER. Just to put those points that I wanted brought up to the committee, and it seems to me that it is as plain as can be, and I believe that is all the committee wants to consider—in the first place, it is probable that these conditions exist; second, that there is so great an expense connected with making these experiments that you can not expect individuals to do it for themselves.

Mr. KING. What is the sum carried in the appropriation bills for such investigations?

STATEMENT OF FREDERICK H. NEWELL, HYDROGRAPHER, UNITED STATES GEOLOGICAL SURVEY.

Mr. NEWELL. The amount for investigation of water resources covered by an item in the sundry civil bill has gradually increased from \$12,500, in 1895, to \$50,000, and last year it was put at \$100,000. That includes investigation all over the United States, with regard to water in streams or under ground.

The CHAIRMAN. Do you know how much is carried in the various bills for the Department of Agriculture and the Geological Survey in the direction of experiments in regard to irrigation?

Mr. NEWELL. The Appropriations Committee of the House is interested in that question, and by instructions from that committee the various items of appropriation made during the last twelve years have been assembled, including various lines relating to irrigation. These include the construction of ditches on Indian reservations, the purchase of tools, implements, water rights, etc., as well as investigations of various kinds in all parts of the United States. An abstract of these laws and appropriation acts is presented herewith.

IRRIGATION SURVEYS AND INVESTIGATIONS BY THE UNITED STATES GEOLOGICAL SURVEY.

LEGISLATION.

The United States Geological Survey is concerned with the water resources of the country primarily through what is known as the organic law contained in the act of Congress of March 3, 1879. To the paragraph creating the office of Director of the Geological Survey the following proviso was attached:

* * * That this officer shall have the direction of the Geological Survey, and the classification of the public lands and examination of the geological structure, mineral resources, and products of the national domain and that the Director and members of the Geological Survey shall have no personal or private interests in the lands or mineral wealth of the region under survey, and shall execute no surveys or examinations for private parties or corporations. (Approved March 3, 1879. Stat. L., vol. 20, p. 394.)

The first requisite in the "classification of the public lands and the examination of the geological structure, mineral resources, and products of the national domain," is a topographic map for guidance and for exhibiting the results. Since the organization of the Survey, therefore, a large part of its energies has been concentrated on the preparation of such a map, showing all elevations by means of contours, also the location of streams, towns, roads, railroads, and canals for irrigation or transportation, isolated houses, and boundaries of States, counties, and towns. This map exhibits the drainage area of streams, the relative elevations of catchment basins and irrigable lands, the topographic features favorable to water conservation, the Land Office lines, the slopes of valleys, and many other details of importance to the development of water powers and of irrigation or the reclamation of the arid lands.

In 1887 the Director of the Geological Survey was called upon by Congress to consider the question of Federal recognition of the irrigation subject. A resolution was passed requiring the Secretary of the Interior, by means of the Director of the Geological Survey, to make an investigation of that portion of the arid region of the United

States where agriculture is carried on by means of irrigation. The resolution reads as follows:

Whereas a large portion of the unoccupied public lands of the United States is located within what is known as the arid region, and now utilized only for grazing purposes, but much of which, by means of irrigation, may be rendered as fertile and productive as any land in the world, capable of supporting a large population, thereby adding to the national wealth and prosperity:

Whereas all the water flowing during the summer months in many of the streams of the Rocky Mountains, upon which chiefly the husbandman of the plains and the mountain valleys chiefly depends for moisture for his crops, has been appropriated and is used for the irrigation of lands contiguous thereto, whereby a comparatively small area has been reclaimed; and

Whereas there are many natural depressions near the sources and along the courses of these streams which may be converted into reservoirs for the storage of the surplus water which during the winter and spring seasons flows through the streams: from which reservoirs the water there stored can be drawn and conducted through properly constructed canals, at the proper season, thus bringing large areas of land into cultivation, and making desirable much of the public land for which there is now no demand; therefore be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled. That the Secretary of the Interior, by means of the Director of the Geological Survey, be, and he is hereby, directed to make an examination of that portion of the arid regions of the United States where agriculture is carried on by means of irrigation, as to the natural advantages for the storage of water for irrigating purposes with the practicality of constructing reservoirs, together with the capacity of the streams and the cost of construction and capacity of reservoirs, and such other facts as bear on the question of storage of water for irrigating purposes; and that he be further directed to report to Congress as soon as practicable the result of such investigation. (Approved March 20, 1888. Stat. L., vol. 25, pp. 618, 619.)

This was followed by the passage of an act containing an appropriation of \$100,000 for the purpose of investigating the extent to which the arid region of the United States can be redeemed by irrigation. This act is as follows:

For the purpose of investigating the extent to which the arid region of the United States can be redeemed by irrigation, and the segregation of the irrigable lands in such arid region, and for the selection of sites for reservoirs and other hydraulic works necessary for the storage and utilization of water for irrigation and the prevention of floods and overflows, and to make the necessary maps, including the pay of employees in field and in office, the cost of all instruments, apparatus, and materials, and all other necessary expenses connected therewith, the work to be performed by the Geological Survey, under the direction of the Secretary of the Interior, the sum of one hundred thousand dollars or so much thereof as may be necessary. And the Director of the Geological Survey, under the supervision of the Secretary of the Interior, shall make a report to Congress on the first Monday in December of each year, showing in detail how the said money has been expended, the amount used for actual survey and engineer work in the field in locating sites for reservoirs, and an itemized account of the expenditure under this appropriation. And all the lands which may hereafter be designated or selected by such United States surveys for sites for reservoirs, ditches, or canals for irrigation purposes and all the lands made susceptible of irrigation by such reservoirs, ditches, or canals are from this time henceforth hereby reserved from sale as the property of the United States, and shall not be subject after the passage of this act to entry, settlement, or occupation until further provided by law:

Provided, That the President may at any time in his discretion by proclamation open any portion or all of the lands reserved by this provision to settlement under the homestead laws. (Approved October 2, 1888. Stat. L., vol. 25, pp. 526, 527.)

In the following year \$250,000 was appropriated for continuing the work. (Approved March 2, 1889. Stat. L., vol. 25, p. 960.)

A portion of the law passed October 2, 1888, was repealed by the following provision in the act approved August 30, 1890 (Stat. L., vol. 26, p. 391), and no appropriation was made for irrigation work as such:

For topographic surveys in various portions of the United States, three hundred and twenty-five thousand dollars, one-half of which sum shall be expended

west of the one hundredth meridian; and so much of the act of October second, eighteen hundred and eighty-eight, entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and eighty-nine, and for other purposes," as provides for the withdrawal of the public lands from entry, occupation, and settlement, is hereby repealed, and all entries made or claims initiated in good faith and valid but for said act, shall be recognized and may be perfected in the same manner as if said law had not been enacted, except that reservoir sites heretofore located or selected shall remain segregated and reserved from entry or settlement as provided by said act, until otherwise provided by law, and reservoir sites hereafter located or selected on public lands shall in like manner be reserved from the date of the location or selection thereof.

No person who shall after the passage of this act, enter upon any of the public lands with a view to occupation, entry or settlement under any of the land laws shall be permitted to acquire title to more than three hundred and twenty acres in the aggregate, under all of said laws, but this limitation shall not operate to curtail the right of any person who has heretofore made entry or settlement on the public lands, or whose occupation, entry or settlement is validated by this act: *Provided*, That in all patents for lands hereafter taken up under any of the land laws of the United States or on entries or claims validated by this act west of the one hundredth meridian, it shall be expressed that there is reserved from the lands in said patent described, a right of way thereon for ditches and canals constructed by the authority of the United States. (Approved August 30, 1890. Stat. L., vol. 26, p. 391.)

Under this law the Survey selected and mapped a large number of reservoir sites, which have been noted on the records of the General Land Office, and are now reserved from entry or settlement. Descriptions of these sites may be found in the Tenth, Eleventh, Twelfth, and Thirteenth Annual Reports of the Geological Survey.

From the above cited paragraphs it appears that the portion of the original law approved October 2, 1888, which affected the withdrawal of the public lands from entry, occupation, and settlement was repealed, but that the remaining portions of the law were unaffected by the act of repeal, and that there is still on the statute books authority for making an examination of the arid region of the United States, for ascertaining the capacity of the streams, and "for the selection of sites for reservoirs and other hydraulic works necessary for the storage and utilization of water for irrigation and the prevention of floods and overflows, and to make the necessary maps."

In the repealing act it was specifically provided that the reservoir sites shall remain segregated for such use, and in a law entitled "An act to repeal timber-culture laws, and for other purposes," approved March 3, 1891, it is provided:

That reservoir sites located or selected and to be located and selected under the provisions of "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and eighty-nine, and for other purposes," and amendments thereto, shall be restricted to and shall contain only so much land as is actually necessary for the construction and maintenance of reservoirs; excluding so far as practicable lands occupied by actual settlers at the date of the location of said reservoirs. (Stat. L., vol. 26, p. 1101.)

Appropriation for irrigation surveys (Powell), including topographic mapping.

Year.	Item.	Amount.	Statutes at Large.
1889.....	Storage reservoir and topographic surveys.....	\$100,000	Vol. 25, p. 526.
1890.....	Investigation of arid region and topographic surveys.....	250,000	Vol. 25, p. 960.

Under the various laws above cited, systematic measurements of the streams of the arid regions were begun by the Division of Hydrography, and were continued after August 30, 1890, as incidental to the

topographic surveys and selection of reservoir sites. By act of August 18, 1894, the following specific appropriation was made for this class of work:

For gauging the streams and determining the water supply of the United States, including the investigation of underground currents and artesian wells in arid and semiarid sections, twelve thousand five hundred dollars. (Approved August 18, 1894. Stat. L., vol. 28, p. 398.)

A further appropriation by act approved March 2, 1895 (Stat. L., vol. 28, p. 940), made available the sum of \$20,000 for the fiscal year 1895-96, and a later act was worded as follows:

For gauging the streams and determining the water supply of the United States, including the investigation of underground currents and artesian wells in arid and semiarid sections, and the preparation of reports upon the best methods of utilizing the water resources of said sections, fifty thousand dollars. (Approved June 11, 1896. Stat. L., vol. 29, p. 436.)

Provision has been made for printing the reports for popular distribution by the following clause in the act last named:

Provided, That hereafter the reports of the Geological Survey in relation to the gauging of streams and to the methods of utilizing the water resources may be printed in octavo form, not to exceed 100 pages in length and 5,000 copies in number: 1,000 copies of which shall be for the official use of the Geological Survey, 1,500 copies shall be delivered to the Senate, and 2,500 copies shall be delivered to the House of Representatives, for distribution. (Approved June 11, 1896. Stat. L., vol. 29, p. 453.)

The current appropriation for the year ending June 30, 1901, \$100,000, is similar to the above, with a slight change in the wording, as follows:

For gauging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells in arid and semiarid sections, and the preparation of reports upon the best methods of utilizing the water resources of said sections, one hundred thousand dollars. (Approved June 6, 1900. Stat. L., vol. 31, p. 617.)

The amounts appropriated for gauging streams, etc., in the sundry civil acts are as follows:

Summary of appropriations for gauging streams (Walcott).

Year.	Item.	Amount.	Approved.	Statute at Large.
1895.....	Gauging streams.....	\$12,500	Aug. 18, 1894	Vol. 28, p. 398
1896.....	Gauging streams.....	20,000	Mar. 2, 1895	Vol. 28, p. 940
1896.....	Gauging streams (agricultural).....	4,500	Apr. 14, 1896	Vol. 29, p. 104
1897.....	Gauging streams.....	50,000	June 11, 1896	Vol. 29, p. 436
1897.....	Gauging streams.....	50,000	June 4, 1897	Vol. 30, p. 37
1899.....	Gauging streams.....	50,000	July 1, 1898	Vol. 30, p. 623
1900.....	Gauging streams.....	50,000	Mar. 3, 1899	Vol. 30, p. 1099
1900.....	Gauging streams (deficiency).....	20,000	Mar. 30, 1900	Vol. 31, p. 57
1901.....	Gauging streams.....	100,000	June 6, 1900	Vol. 31, p. 617
	Total.....	\$357,000		

CONSTRUCTING IRRIGATING DITCHES, ETC., UNDER INDIAN OFFICE.

LEGISLATION.

The Office of Indian Affairs, having in charge the execution of various acts of Congress relative to the Indians, has, as incidental to the support of various tribes located within the arid region, the construe-

tion and maintenance of irrigation canals, the sinking of artesian wells, and the providing of other means of water supply.

For the construction, purchase, and use of irrigating machinery and appliances in Arizona, Montana, and Nevada for the uses of Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, thirty thousand dollars, to be immediately available. (Approved March 3, 1891. Stat. L., vol. 26, p. 1011.)

The most important irrigation system under construction by the Indian Office is that upon the Crow Indian Reservation in Montana. This results from the agreement concluded with the Crow Indians December 8, 1890, and ratified by the act of March 3, 1891, appropriating \$200,000. By a supplemental agreement concluded August 27, 1892, a further sum of \$200,000 was added to the irrigation fund, with the provision that not exceeding \$100,000 might be used in any one year, and if a less sum were expended in any one year the difference might thereafter be expended in addition to the \$100,000 available for that year.

There is hereby appropriated and set apart two hundred thousand dollars to be expended under the direction of the Secretary of the Interior in the building of dams, canals, ditches, and laterals for the purposes of irrigation in the valleys of the Big Horn and the Little Big Horn rivers, and on Pryor Creek and such other streams as the Secretary of the Interior may deem proper: *Provided*, That not to exceed fifty thousand dollars shall be expended annually in performing this work: *And provided further*, That the superintendent in charge of said works shall, in the employment of laborers, be required to give preference to such Indians of the Crow tribe as are competent and willing to work at the average wages paid to common laborers for the same kind of work, and the labor so employed shall be paid in cash.

That the sum of seventy-five thousand dollars is hereby appropriated and set apart as an irrigating fund, to be expended under the direction of the Secretary of the Interior for the maintenance and management of the system of irrigation provided for in this agreement. (Stat. L., vol. 26, p. 1040.)

Irrigation Indian reservations: For the construction, purchase, and use of irrigating machinery and appliances on Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, forty thousand dollars. (Approved July 13, 1892. Stat. L., vol. 27, p. 137.)

A number of annual appropriations have been made for the purpose of constructing irrigating ditches, for the purchase of machinery, and for sinking artesian wells, as well as occasional appropriations for supplying water on various Indian reservations. The following are the most important of these acts:

For the construction of irrigating ditches and the development of a water supply for agricultural, stock, and domestic purposes on the Navajo Indian Reservation, forty thousand dollars, to be expended in the discretion of the Secretary of the Interior. (Approved March 3, 1893. Stat. L., vol. 27, pp. 627, 628.)

In addition to this sum of \$40,000, there was a balance of about \$20,000 remaining from previous appropriations, making a total of \$60,000, regarded as available for this purpose.

For the construction, purchase, and use of irrigating machinery and appliances on Indian reservations, in the discretion of the Secretary of the Interior, forty thousand dollars: *Provided*, That of this sum a sufficient amount may be used to sink one artesian well at each of the three following places, namely: Rosebud Reservation, Standing Rock Reservation, and Pine Ridge Reservation, in South Dakota, neither of said wells to cost more than five thousand dollars. (Approved March 3, 1893. Stat. L., vol. 27, p. 631.)

For the construction, purchase, and use of irrigating machinery and appliances on Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, thirty thousand dollars.

The Secretary of the Interior is directed to contract with responsible parties for the construction of irrigating canals and the purchase or securing of water supply on the Fort Hall Indian Reservation, in the State of Idaho, for the purpose of

irrigating the lands of said reservation: *Provided*, That the expense of constructing said canals and the purchase or securing of water supply shall be paid out of moneys belonging to the said Fort Hall Indians now in the Treasury of the United States and subject to the disposition of the Secretary of the Interior for the benefit of said Indians. (Approved, August 15, 1894. Stat. L., vol. 28, p. 305.)

For the construction, purchase, and use of irrigating machinery and appliances on Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, thirty thousand dollars. (Approved, March 2, 1895. Stat. L., vol. 28, p. 900.)

For the construction, purchase, and use of irrigating tools and appliances on Indian reservations, in the discretion of the Secretary of the Interior, and subject to his control, thirty thousand dollars, and of this amount not exceeding two thousand seven hundred dollars may be used for the temporary employment of persons of practical experience in irrigation work at a compensation not to exceed seventy-five dollars per month, each, and not exceeding one thousand five hundred dollars for necessary traveling and incidental expenses of such persons. (Approved, June 10, 1896. Stat. L., vol. 29, p. 341.)

To enable the Secretary of the Interior to put down an artesian well or wells at or near Lake Andes, on the Yankton Indian Reservation, South Dakota, at such place or places as he may determine, for the purpose of supplying said Indians with water for domestic purposes, for stock, and for irrigation purposes, five thousand dollars. (Approved, June 10, 1896. Stat. L., vol. 29, p. 343.)

For construction of ditches and reservoirs, purchase and use of irrigating tools and appliances on Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, thirty thousand dollars; and of this amount not exceeding two thousand seven hundred dollars may be used for the temporary employment of persons of practical experience in irrigation work, at a compensation not to exceed one hundred dollars per month each, and not exceeding one thousand five hundred dollars for necessary traveling and incidental expenses of such persons. (Approved, June 7, 1897. Stat. L., vol. 30, p. 85.)

For construction of ditches and reservoirs, purchase and use of irrigating tools and appliances, and purchase of water rights in Indian reservations, in the discretion of the Secretary of the Interior and subject to his control, forty thousand dollars. (Approved, July 1, 1898. Stat. L., vol. 30, p. 591.)

The Secretary of the Interior shall make investigation as to the practicability of providing a water supply for irrigation purposes, to be used on a portion of the reservation of the Southern Utes in Colorado, and he is authorized, in his discretion, to contract for, and to expend from the funds of said Southern Utes in the purchase of, perpetual water rights sufficient to irrigate not exceeding ten thousand acres on the western part of the Southern Ute Reservation, and for annual charges for maintenance of such water thereon, such amount and upon such terms and conditions as to him may seem just and reasonable, not exceeding one hundred and fifty thousand dollars for the purchase of such perpetual water rights, and not exceeding a maximum of fifty cents per acre for the maintenance of water upon land irrigated, provided that after such an investigation he shall find all the essential conditions relative to the water supply and to the perpetuity of its availability for use upon said lands, such as in his judgment will justify a contract for its perpetual use: *Provided*, That the Secretary of the Interior, upon making all such contracts, shall require from the person or persons entering into such contracts a bond of indemnity, to be approved by him, for the faithful and continuous execution of such contract as provided therein. (Approved, July 1, 1898. Stat. L., vol. 30, p. 593.)

For ascertaining the depth of the bed rock at a place on the Gila River in Gila County, Arizona, known as The Buttes, and particularly described in Senate Document Numbered Twenty-seven, Fifty-fourth Congress, second session, and for ascertaining the feasibility, and estimating in detail the cost, of the construction of a dam across the river at that point for purpose of irrigating the Sacaton Reservation, and for ascertaining the average daily flow of water in the river at that point, twenty thousand dollars, or so much thereof as may be necessary, the same to be expended by the director of the United States Geological Survey, under the direction of the Secretary of the Interior: *Provided*, That nothing herein shall be construed as in any way committing the United States to the construction of said dam. And said director shall also ascertain and report upon the feasibility and cost of the Queen Creek project mentioned in said Senate document. (Approved, July 1, 1898. Stat. L., vol. 30, p. 594.)

For construction of ditches and reservoirs, purchase and use of irrigating tools and appliances, and purchase of water rights on Indian reservations, in the discretion of the Secretary of the Interior, and subject to his control, forty thousand dollars. (Approved, March 1, 1899. Stat. L., vol. 30, pp. 940, 941.)

That the Secretary of the Interior shall make investigation as to the practicability of providing a water supply for irrigation purposes, to be used on a portion of the reservation of the Southern Utes in Colorado, and he is authorized, in his discretion, to contract for, and to expend from the funds of said Southern Utes in the purchase of, perpetual water rights sufficient to irrigate not exceeding ten thousand acres on the western part of the Southern Ute Reservation, and for annual charges for maintenance of such water thereon, such amount and upon such terms and conditions as to him may seem just and reasonable, not exceeding one hundred and fifty thousand dollars for the purchase of such perpetual water rights, and not exceeding a maximum of fifty cents per acre per annum for the maintenance of water upon the land to be irrigated: *Provided*, That after such an investigation he shall find all the essential conditions relative to the water supply and to the perpetuity of its availability for use upon said lands, such as in his judgment will justify a contract for its perpetual use: *Provided*, That the Secretary of the Interior, upon making all such contracts, shall require from the person or persons entering upon such contract, a bond of indemnity, to be approved by him, for the faithful and continuous execution of such contract as provided therein." (Approved, March 1, 1899. Stat. L., vol. 30, p. 941.)

For construction of ditches and reservoirs, purchase and use of irrigating tools and appliances, and purchase of water rights, on Indian reservations, in the discretion of the Secretary of the Interior, and subject to his control, fifty thousand dollars: *Provided*, That the Secretary of the Interior may employ superintendents of irrigation, who shall be skilled irrigating engineers, not to exceed two, as in his judgment may be necessary to secure the construction of ditches and other irrigation works in a substantial and workmanlike manner; and also one clerk in the Office of Indian Affairs, at a salary of one thousand dollars per annum. (Approved, May 31, 1900. Stat. L., vol. 31, p. 239.)

The principal appropriations for the construction of irrigation ditches, etc., under the Office of Indian Affairs are as follows:

Principal appropriations for construction of irrigation ditches, etc., under Office of Indian Affairs.

Year ending—	Item.	Amount.	Date approved.	Statutes at Large.
1892	Irrigating machinery	\$30,000	Mar. 3, 1891	Vol. 26, p. 1011
1892	Crow Indians	275,000	do	Vol. 26, p. 1040
1893	Irrigating machinery	40,000	July 13, 1892	Vol. 27, p. 137
1894	Navajo Indians	40,000	Mar. 3, 1893	Vol. 27, p. 627
1894	Irrigation and artesian wells	40,000	do	Vol. 27, p. 631
1895	Irrigation machinery, etc.	30,000	Aug. 15, 1894	Vol. 28, p. 305
1895	Fort Hull Canal (cost not stated) .....	.....	.....	Vol. 28, p. 305
1896	Irrigation, etc.	30,000	Mar. 2, 1895	Vol. 28, p. 900
1897	do	30,000	June 19, 1896	Vol. 29, p. 341
1897	Artesian well, South Dakota	5,000	do	Vol. 29, p. 343
1898	Construction of ditches, etc.	30,000	June 7, 1897	Vol. 30, p. 85
1899	do	40,000	July 1, 1898	Vol. 30, p. 591
1899	Southern Ute (\$150,000) .....	.....	do	Vol. 30, p. 593
1899	Gila River, Buttes dam	20,000	do	Vol. 30, p. 594
1900	Construction of ditches, etc.	40,000	Mar. 1, 1899	Vol. 30, p. 940
1900	Southern Utes (\$150,000) .....	.....	do	Vol. 30, p. 941
1901	Construction of ditches, etc.	50,000	May 31, 1900	Vol. 31, p. 239
	Total	700,000		

IRRIGATION INVESTIGATIONS OF THE DEPARTMENT OF AGRICULTURE.

Office of Irrigation Inquiry.—This office was created in 1890, and continued, by various acts of Congress, until 1892. These acts are as follows:

Location for artesian wells: To authorize the Secretary of Agriculture to make such preliminary investigation of an engineering and other character as will, so far as practicable, determine the proper location for artesian wells for irrigation purposes within the area west of the ninety-seventh meridian and east of the foothills of the Rocky Mountains, twenty thousand dollars; and a report on all operations and expenditures hereunder shall be made to Congress immediately after July first, eighteen hundred and ninety: *Provided*, That no part of said amount

shall be expended in sinking wells or the construction of irrigation works, and the work done under this appropriation shall be completed and a report of the same made within the appropriation, and nothing herein shall commit the Government to any plan or irrigation or the construction of works therefor. (Approved April 4, 1890. Stat. L., vol. 26, p. 42.)

Irrigation investigations: To enable the Secretary of Agriculture to continue to completion his investigations for the purpose of determining the extent and availability for irrigation of the underflow and artesian waters within the region between the ninety-seventh degree of longitude and the eastern foothills of the Rocky Mountains, and to collect and publish information as to the best methods of cultivating the soil by irrigation, forty thousand dollars: *Provided*, That no part of said sum shall be expended under unless the entire investigation, collection, and publication contemplated herein, including the report thereon, can be fully and finally completed and finished before July first, eighteen hundred and ninety-one, without any additional expense, cost, or charge being incurred. (Approved September 30, 1890. Stat. L., vol. 26, p. 526.)

Contingent expenses: The time for the final completion of the report of the extent and availability for irrigation by the underflow and artesian water within the region between the ninety-seventh degree of longitude and the eastern foothills of the Rocky Mountains, and the collection and publication of information as to the best method of cultivating the soil by irrigation, limited to the first of July, eighteen hundred and ninety-one, by the act of September thirtieth, eighteen hundred and ninety, is hereby extended to the first day of January, eighteen hundred and ninety-two; and the sum of ten thousand dollars is hereby appropriated to enable the Secretary of Agriculture to correct and publish information as to the best methods of cultivating the soil by irrigation. (Approved March 3, 1891. Stat. L., vol. 26, p. 1052.)

The balance of the sum of ten thousand dollars, appropriated by act of March third, eighteen hundred and ninety-one, to enable the Secretary of Agriculture to collect and publish information as to the best methods of cultivating the soil by irrigation, remaining unexpended on January first, eighteen hundred and ninety-two, is hereby reappropriated and made available for said purposes until the fifteenth day of April next, and out of said amount the disbursing officer of the Department of Agriculture shall be reimbursed in the sum of nine hundred and eighteen dollars and seventy-six cents by him paid out since January first, eighteen hundred and ninety-two, as salaries and expenses of the division of said Department having charge of the irrigation inquiry, and from said amount there shall also be paid all unpaid balances of compensation due persons heretofore employed in said division for services rendered and not yet paid for, said report and all proceedings hereunder to be completed by the fifteenth day of April. (Approved March 18, 1892. Stat. L., vol. 27, p. 10.)

The Office of Irrigation Inquiry was reorganized in 1892, and annual appropriations have been made as follows:

To enable the Secretary of Agriculture to collect information as to the best modes of agriculture by irrigation, six thousand dollars. (Approved July 5, 1892. Stat. L., vol. 27, p. 76.)

To enable the Secretary of Agriculture to continue the collection of information as to the best modes of agriculture by irrigation, six thousand dollars. (Approved March 3, 1893. Stat. L., vol. 27, p. 741.)

To enable the Secretary of Agriculture to continue the collection of information as to the best modes of agriculture by irrigation, six thousand dollars. (Approved August 8, 1894. Stat. L., vol. 28, p. 271.)

To enable the Secretary of Agriculture to continue the collection of information as to the best modes of agriculture by irrigation, fifteen thousand dollars. (Approved March 2, 1895. Stat. L., vol. 28, p. 735.)

No appropriations for irrigation investigations by the Department of Agriculture were made from 1895 to 1898:

Irrigation information: For the purpose of collecting from agricultural colleges, agricultural experiment stations, and other sources, including the employment of special agents, valuable information and data on the subject of irrigation, and publishing the same in bulletin form, ten thousand dollars. (Approved March 22, 1898. Stat. L., vol. 30, p. 335.)

Irrigation investigations: To enable the Secretary of Agriculture to investigate and report upon the laws and institutions relating to irrigation and upon the use of irrigation waters, with special suggestions of better methods for the utilization

of irrigation waters in agriculture than those in common use, and for the preparation, printing, and illustration of reports and bulletins on irrigation; and the agricultural experiment stations are hereby authorized and directed to cooperate with the Secretary of Agriculture in carrying out said investigations in such manner and to such extent as may be warranted by a due regard to the varying conditions and needs of the respective States and Territories, and as may be mutually agreed upon; and ten thousand dollars of the amount hereby appropriated shall be immediately available, thirty-five thousand dollars. (Approved March 1, 1899. Stat. L., vol. 30, p. 953.)

Irrigation investigations: To enable the Secretary of Agriculture to investigate and report upon the laws and institutions relating to irrigation and upon the use of irrigation waters, with especial suggestions of better methods for the utilization of irrigation waters in agriculture than those in common use, and for the preparation, printing, and illustration of reports and bulletins on irrigation; and the agricultural experiment stations are hereby authorized and directed to cooperate with the Secretary of Agriculture in carrying out said investigations in such manner and to such extent as may be warranted by a due regard to the varying conditions and needs of the respective States and Territories as may be mutually agreed upon, fifty thousand dollars. (Approved May 25, 1900. Stat. L., vol. 31, p. 199.)

Summarized, the appropriations for irrigation investigations of the Department of Agriculture are as follows:

Appropriations for irrigation investigations of the Department of Agriculture.

Year.	Item.	Amount.	Approved.	Statutes at Large.
1890	Artesian wells	\$20,000	Apr. 4, 1890	Vol. 26, p. 42
1891	Irrigation investigation.....	40,000	Sept. 30, 1890	Vol. 26, p. 526
1892	Underflow	10,000	Mar. 3, 1891	Vol. 26, p. 1052
1893	Modes of irrigation.....	6,000	July 5, 1892	Vol. 27, p. 76
1894	do	6,000	Mar. 3, 1893	Vol. 27, p. 741
1895	do	6,000	Aug. 8, 1894	Vol. 28, p. 271
1896	do	15,000	Mar. 2, 1895	Vol. 28, p. 735
1897	.....		
1898	.....		
1899	Irrigation information	10,000	Mar. 22, 1898	Vol. 30, p. 335
1900	Irrigation laws, etc.....	35,000	Mar. 1, 1899	Vol. 30, p. 953
1901	do	50,000	May 25, 1900	Vol. 31, p. 199
	Total	198,000		

SUMMARY OF APPROPRIATIONS.

Summarized, the direct appropriations are as follows:

Summary of direct appropriations.

Item.	Years.	Amount.
Arid-land survey (Powell)	1888-1890	\$350,000
Gaging streams (Walcott)	1895-1901	357,000
Construction ditches, etc., Indian Office	1894-1901	700,000
Irrigation investigations, Department of Agriculture.....	1890-1901	198,000
Total		1,605,000

The total of \$1,605,000 appropriated directly for surveys, investigations, and construction having to do with irrigation is by no means the total chargeable to the arid regions. It forms a portion of various items of work which has been and is being carried on by several organizations and bureaus.

For example, the first item of \$350,000 for arid-land surveys was for the most part devoted to topographic mapping of the catchment

basins of the important streams, work which previous to 1888-1890 had been carried on under the appropriation for topography, and which was subsequently resumed under that head. It is, therefore, but a small part of the several million dollars already expended in mapping the public lands of the West.

The next item of \$357,000 for gaging the streams is not strictly chargeable to the arid region, since about one-fourth to one-third of the amount has been expended in measuring the streams in the humid regions of the East, where water power is of greatest importance.

The third and largest item in the statement, \$700,000, is, in round numbers, the amount appropriated for the construction of ditches, canals, and reservoirs for the Indians, for purchasing water rights, and for tools. Many times this amount has presumably been spent within the Indian reservations, the greater part of which are within the arid region, in other work relating to agriculture by irrigation. Not all of this \$700,000 appropriation has been expended, as much of it has been appropriated for water rights which have not yet been acquired.

The fourth item of appropriation, \$198,000 to the Department of Agriculture, is also only a small proportion of the total amount expended for agricultural colleges and experiment stations within the arid regions. In effect it increases the efficiency of the experiment stations along lines of work which have been initiated toward assisting the farmers of the arid region to improve their condition.

Besides the items mentioned, several million dollars have been expended under the General Land Office in surveying and subdividing the lands of the arid region; also in various military expeditions and in explorations for railroads. All of the information thus obtained in its way becomes part of the broad knowledge upon which must be based general conclusions as to the extent to which the arid lands can be redeemed by irrigation.

While on the one hand the items of direct appropriation which I have noted form but a small proportion of the total sum expended upon problems connected with the arid land, it must not be supposed that these appropriations have been intended or expended specifically in ascertaining the cost and benefit of reclaiming the arid region. Most of the expenditures have been, as already stated, along the line of obtaining general information and not detailed facts upon which estimates can be based. It is important to take out the sums which have actually been expended along this line, and to ascertain how much more work should be done to definitely discuss the subject of water conservation; in other words, in making surveys on which to base estimates.

As before stated, the appropriations made up to the present time for matters pertaining to irrigation have been available for what may be called conclusive results to only a limited extent. The general topographic surveys of the catchment basins of the streams and the measurement of the flow form the basis of knowledge, but in themselves they are not sufficient for preparing the estimates of costs and benefits. Out of the first appropriation for surveys (that of 1888-1890, \$350,000) about \$100,000 was expended in examining 147 reservoir sites and in preparing estimates and details for the following reclamation projects: In Montana, on Sun River; in Colorado, on Arkansas River; in Kansas, for a large canal line in the western part of the State; in Texas and New Mexico, for the proposed international reservoir above El Paso; in California, for a reservoir at Clear Lake,

for exploring Pit River, and for a number of localities in the high sierras; in Nevada and California, for water storage on Truckee and Carson rivers; in Utah, for the storage of water in Utah Lake; and in Idaho, for the diversion of Snake River. The total expenditure on these engineering surveys—in round numbers, \$100,000—was approximately \$10,000 for each of the large projects studied. The remainder of the \$350,000 was expended in preparing topographic maps. Approximately 43,000 square miles of important river basin were mapped, the estimated cost being not far from \$5 per square mile surveyed, including all salaries and office expenditures.

Since 1890 only a few detailed estimates have been prepared, these being possible under the appropriation for preparing reports upon the best methods for utilizing the water resources. The possibility of water storage on Gila River in Arizona has been carefully discussed; also conservation projects in portions of California, Nevada, Wyoming, Montana, and Colorado, as already mentioned. (See pp. 27-30.) The amount thus expended in engineering surveys is relatively small, and must be notably increased before a complete knowledge of the cost of reclamation can be had, with detailed figures as to each important project.

To complete the examination of this vast area in ten years will necessitate an annual expenditure of, say, \$10,000 a year in each of the States and Territories having arid and semiarid lands. This amount will make possible systematic measurements of the streams, survey of reservoir sites, examination of the character of the foundations of dam sites from which to estimate the cost of the construction of dams, and carry on other examinations exclusive of the topographic mapping. An appropriation of \$200,000 a year is needed to push forward this work, including the measurement of streams and the examination and mapping of underground waters and artesian wells.

The estimates made for continuing this work during the next fiscal year are as follows:

SPECIAL SURVEYS IN ARID AND SEMIARID REGIONS.

Arizona:

Surveying reservoir sites, determining amount of water in Gila and Salt rivers, including Santa Cruz River, and investigating artesian conditions.....	\$6,000
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California:

Northern—Surveys of reservoir sites on head waters of Kings, Kern, and San Joaquin rivers.....	10,000
Examination and mapping of underground waters in San Joaquin Valley.....	5,000
Southern—Examination and mapping of underground waters in San Bernardino Valley.....	5,000
Examination of country adjacent to Colorado River and estimates of cost of utilizing Colorado River by pumping or by gravity canals.....	11,000

Colorado:

Surveys of reservoir sites on head waters of Platte River.....	4,000
Examination of feasibility of storing water in northeastern Colorado.....	3,000
Examination of reservoir sites on Arkansas River and Rio Grande.....	8,000
Reconnaissance for diversion of Gunnison River in southwestern Colorado.....	5,000
Examination of underground waters and drilling test well in eastern Colorado.....	10,000

Idaho:

Survey for diversions of water from Snake River and obtaining underground waters on Snake River plains.....	5,000
Examination of reservoir sites on head waters of Boise, Weiser, and Payette and Lost rivers of Idaho.....	4,000

Kansas:	
Drilling test well in northwestern Kansas.....	10,000
Montana:	
Continuation of the St. Mary River surveys.....	7,000
Continuation of the Madison River-Helena survey.....	5,000
Surveys for diversion of water from Yellowstone River.....	11,000
Nebraska:	
Drilling test well in western Nebraska.....	10,000
Nevada:	
Continuation of reservoir surveys on Carson and Walker rivers.....	9,000
New Mexico:	
Survey of reservoir sites on Rio Grande.....	6,000
North Dakota:	
Continuation of mapping of underground waters and survey of canal line from Missouri River.....	10,000
Oregon:	
Continuation of examination of deep waters in northwestern Oregon.....	4,000
Exploration for reservoir sites on head waters of Owyhee and Malheur rivers.....	5,000
South Dakota:	
Investigation of deep waters in western part of State; drilling test well.....	10,000
Texas:	
Surveys for water storage in trans-Pecos Texas.....	5,000
Utah:	
Surveys of reservoir sites on Sevier River.....	4,000
Examination of head waters of Provo and Weber rivers.....	3,000
Reconnaissance for diversion of Grand and Green rivers in southeastern Utah.....	5,000
Washington:	
Surveys of reservoir sites on head waters of Yakima River and tributaries.....	6,000
Examination of artesian conditions of central Washington.....	4,000
Wyoming:	
Surveys for storage and diversion of Green River and tributaries.....	6,000
Surveys for conservation of water on North Platte River.....	4,000
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Total for special surveys in arid regions.....	200,000

In estimating the cost of reclamation of the lands of the arid regions, a wide latitude is possible, since, as before stated, we do not possess detailed estimates of the cost of each large project. It is necessary, therefore, to fall back upon a general knowledge, such as that which has been obtained by the reconnoissances, topographic mapping, and stream gagings just described. By means of these, certain broad facts have been developed; but these must be supplemented by the detailed engineering surveys before exact and unqualified statements can be made.

The largest uncertain factor in the question of reclamation is the amount of water which can be rendered available through storage in the ground, through seepage or percolation, and which will ultimately, after many months or years, find its way into the drainage channels, or rise to a point where it can be recovered by ordinary wells. The question, also, of the practicability of recovery by wells rests upon the cost of power. With complete water conservation in the mountains, cheap power becomes available through electrical transmission by which to recover this water otherwise lost. Judging from the experience of the developed areas of the arid region, it may be estimated that if water is conserved for the direct reclamation of, say, 1,000,000 acres, there will be possible an ultimate reclamation of 2,000,000 acres, through seepage works, pumping plants, and other devices erected by individuals. In other words, if the Government, by means of large storage works or by diverting water from great rivers by means of tunnels or other hydraulic works, should provide

water for 25,000,000 acres which otherwise could not be irrigated, it would render possible the gradual utilization of the entire 75,000,000 acres, the remainder being reclaimable through the smaller or individual systems.

The area of land reclaimable if water could be had amounts to several hundred million acres, but the supply of water being limited, the amount which can actually be reclaimed depends directly upon the water resources. These, though fluctuating from year to year, are fixed by nature within narrow limits, there being probably enough, when properly conserved, to irrigate 75,000,000 acres. It is not necessary, as before noted, for the Government to conserve water for all of this area, as by the removal of certain great obstacles individual enterprises will be able to put water upon the greater part of the land. Thus, as above stated, it may be fair to assume that if the Government conserves water for 25,000,000 acres, individuals or corporations will be able to obtain water for the remaining 50,000,000.

The cost of water conservation, as shown by surveys in different parts of the United States, may range from less than \$1 to over \$10 per acre reclaimed. As an average, \$5 per acre may be taken as the cost of reclamation in a large way.

It is not necessary nor advisable to attempt to reclaim all of the land at once, but it is essential that certain steps be taken looking toward such action. It will be more economical to make small expenditures at first and gradually increase these, so that in order to conserve the water supply expenditures shall extend throughout at least twenty-five years. These expenditures may best be made at the rate of, say, \$2,000,000 per annum for five years; \$4,000,000 per annum for the next five years; \$5,000,000 per annum for the next five years, and \$7,000,000 per annum for ten years additional, or, in all, \$125,000,000. These amounts, it has been estimated, can be realized from the disposal of the public lands. Ten per cent of these amounts will be needed for the surveys and examinations leading up to the construction of the reservoirs.

With this amount invested by the Government in the removal of obstacles to development, it will be possible, as already stated, for private capital to invest amounts many times as great in putting the lands under irrigation.

The cost of maintenance of permanent works will be relatively small, and following the precedent set by law and by custom the cost of maintenance should be assessed against the lands receiving the water whenever the works are completed and the land passes completely into private ownership.

In regard to artesian-well explorations, I wish to bring out one point which Mr. Reeder has overlooked, and that is that this vast Plains area is unique in this respect. It is a country which belongs in great part to the United States. It is a country where people have attempted to make homes, where thousands of people have been driven out by lack of water. The attempt to secure water by individual enterprise involves such a large expenditure relative to the value of the property of the people and to the large area of land owned by the United States that it differs from conditions of all other places where water has been searched for and proved to exist by private enterprise. The United States is the great land owner. The individuals have tried to get water and have failed, and have come almost to the point of actual starvation over a large part of this area for the want of it.

The CHAIRMAN. In making your statement and report as to the

amount of appropriations for irrigation of arid lands for these Departments, could you also give us a summary of what has been accomplished?

Mr. NEWELL. That I think could be done, although the facts are scattered through many volumes of public reports. In the matter of the Indian Office, where the large expenditures have been (nearly two-thirds of the whole), I doubt whether there are any printed reports as to what has been done.

The CHAIRMAN. We can probably find out something from the Indian Office.

Mr. NEWELL. Yes, sir.

Mr. BARHAM. What would the probability be—taking the average of what has come into the Treasury—what would the probability be as to the amount of receipts from that same source in the future?

Mr. NEWELL. So far as I can learn from the Land Office, the receipts for the next few years will be relatively as large. They may run up to \$2,000,000; but I think the receipts for the last fiscal year, ending June 30, 1900, and amounting to \$2,836,883, are considerably above the average, although the people in the Land Office do not seem to think there will be much diminution.

The cash receipts of the General Land Office from disposal of public lands are derived mainly from commuted homestead, desert land, timber and stone land, mineral land, and coal land, in the order named.

The total amount received on account of sales of public lands decreased from about \$11,000,000 in 1888 to about \$900,000 in 1897, and has steadily increased since, until, at the close of the fiscal year ending June 30, 1900, the amount was nearly \$3,000,000.

This will probably continue to increase for several years to come, owing to the new law known as the "Free homes bill," the opening of Indian reservations to settlement, and for other reasons.

Mr. NEWLANDS. Do you not think that the entering upon a comprehensive plan of reclamation in the arid region will stimulate settlement in that region, and thereby increase that income?

Mr. NEWELL. Certainly.

Mr. BARHAM. What provision is there for the sale of arid lands?

Mr. NEWELL. There is a commutation of the homestead entry, then there is the desert-land entry of 320 acres, the mineral lands, the stone lands, and various pieces of land, which, though small in themselves, command a considerable price.

Mr. BARHAM. But as to arid lands: There is no provision for the sale of arid lands, and they are still open to homestead and desert-land entry?

Mr. NEWLANDS. Is it not your opinion that unless within a few years a system of reclamation is entered upon, the proceeds from the sale of Government lands will be greatly reduced?

Mr. NEWELL. Yes, sir. When all the forest reserves necessary have been created, the receipts then will drop off very much. Just at this time there is considerable activity in the Land Office, which will undoubtedly cease.

Mr. NEWLANDS. Is not the large sum received during the last year from the sale of salt or mineral lands caused by the increased activity in mining in those States?

Mr. NEWELL. Yes, sir, largely; but it is not to be charged to that wholly.

Mr. BARHAM. Have you any completed survey and estimate of the cost of reclamation of any section or watershed?

Mr. NEWELL. There is a notable one which we have completed, and in which great public interest is now centering—that on the Gila River. That has just been before the Senate and a provision has been inserted in the Indian bill (H. R. 12904) beginning the construction, as follows:

For completing the necessary preliminary investigations and plans and estimates of cost in detail for the construction of a dam across the Gila River near San Carlos, Arizona, for storing the flood waters of the Gila River, the water so stored to be used, first, for the benefit of the Pima, Papago, and Maricopa Indians for irrigating the lands of the Gila River Reservation, the stored water in excess of the needs of the Indians to be used for reclaiming and irrigating vacant public lands; and also for acquiring and preparing the dam site and for continuing the measurement of the daily flow of water in the Gila River, and for surveying and locating and preparing plans and estimates of cost of construction, with Indian labor, of the necessary canals for carrying the water from said reservoir to the lands to be irrigated on the said Indian reservation, and investigating the amount of water necessary to be reserved for the use of the said Indians, and for examining, surveying, and designating the vacant public lands which could be irrigated with the stored water from said reservoir in excess of the needs of the Indians, and in preparing the plans and estimates for the construction of said reservoirs and canals, with detailed reasons therefor, and giving as accurate an estimate as possible of the total amount which could be received from the sale of the land irrigated to actual settlers, with the facts and circumstances upon which such estimate is based, the sum of one hundred thousand dollars, or so much thereof as may be necessary, the same to be expended under the direction of the Secretary of the Interior: *Provided*, That for all unskilled labor required Indians shall be employed so far as practicable. And the Secretary of the Interior is hereby directed to reserve from entry and settlement all unappropriated lands within townships three, four, five, six, and seven south, ranges eight, nine, and ten east of Gila and Salt River meridian, until the examination, survey, and designation of irrigable lands hereinbefore provided for shall have been completed; and upon the approval of such survey and designation by the Secretary of the Interior the lands not designated as irrigable shall be restored to entry and settlement.

And the Secretary of the Interior is authorized and directed, out of the appropriation immediately preceding, to cause to be made by competent engineers an investigation and report as to whether an adequate water supply for the Indians upon said reservation can be obtained by the method recommended by Indian Inspector Walker H. Graves, in his report dated Pima Indian Reservation, Arizona, September twelfth, nineteen hundred, and if so, at what cost: *Provided*, That nothing herein shall be construed as in any way committing the United States to the construction of said dam at San Carlos.

Mr. BARHAM. Did you estimate the cost of a system of irrigation there?

Mr. NEWELL. We estimated the cost of water conservation. The distribution system was also estimated upon, but I do not include it because it is something which will take care of itself. The construction is so comparatively easy that if the system is built the water can be disposed of, and the distribution necessarily follows.

Mr. BARHAM. Have you any other completed system of surveys?

Mr. NEWELL. The other estimated systems are on the Humboldt in Nevada, the Truckee in Nevada, which offers interstate problems, and the diversion of the St. Mary River to the Milk River, the survey of which is not fully completed. This is in northern Montana, the St. Mary River being a stream rising in the United States, in the Rocky Mountains, receiving the drainage from them and carrying it immediately north. East of it heads the Milk River, which flows for several hundred miles before emptying into the Missouri River. Milk River, although so long, does not receive enough water to supply a continuous flow through its whole length, at all seasons. By a relatively short diversion canal it is possible to take the water out of the St. Mary River and let it flow into the Milk River; in other words, to divert it before reaching the Canadian border, and turn it through Milk River, whose waters run finally into the Gulf of Mexico.

Mr. WILSON, of Idaho. Have you any other completed system?

What I am trying to get at is, Have you anything that you could report at the next session of Congress?

Mr. NEWELL. We have a number of projects and estimates reported at this session, such as the Humboldt and the Truckee, and the King River and the Salinas River in California, the St. Mary in Montana, the Grey Bull in Wyoming.

Mr. WILSON, of Idaho. Then if we call for a complete survey or estimate, you can give it, of five or six of the separate problems?

Mr. NEWELL. Yes, sir.

The CHAIRMAN. What would be the relative expense of carrying out Judge Barham's bill (H. R. 13779)?

Mr. BARHAM. That simply calls for a special survey of everything necessary, including wells and reservoirs, and the diversion of streams.

The CHAIRMAN. Your bill practically covers the whole scheme, and calls for information as to just how much of this work there is, and how much it will cost, and how much land in the United States, as I understand, can be irrigated successfully, and what will be the cost?

Mr. NEWELL. That is as difficult to answer as it would be to say what will be the total cost of the rural free-delivery system, or of the river and harbor improvements, the amount of the river and harbor bill; but to set some sort of a reasonable limit, I will say that an annual appropriation of \$250,000 a year, continued for six or seven years, would doubtless cover the cost of survey of all of the feasible schemes.

Mr. BARHAM. He does not mean by that that the Government of the United States will irrigate the lands; that is simply for the surveys. That amount is safe to mention, but not without qualification.

Mr. KING. Would it be enough to make an appropriation of \$1,500,000 now, to be expended by the Geological Survey with peremptory instructions in the bill, such as Congress may give, that the Geological Survey may enter upon a comprehensive survey of the arid lands owned by the Government of the United States, and, in order to speedily accomplish the work at the earliest possible date, to provide that the Department shall employ the best engineers obtainable, with a view to reporting, first, the number of acres susceptible of reclamation; second, the sources of water; and, third, the cost of constructing dams for diverting streams that you do not need to store; and also the construction of the necessary dams and canals which the Government, if it embarks upon the enterprise, should construct, submitting all that to Congress. Don't you think it would be better to make one large appropriation and enter upon this scheme in a comprehensive manner rather than to take it up in pieces immediately, without presenting to the people of the United States the scheme in all its fullness, and all of its benefits and disadvantages, if there are any?

Mr. NEWELL. That would be the most satisfactory and economical way—to provide an appropriation running over a considerable length of time. The great trouble with annual appropriations is the uncertainty of the future and the difficulty of starting surveys at once and getting the best men. With annual appropriations you can not assure them that you can continue them at this work for a reasonable length of time, or that the result will be accomplished. So that economy and efficiency would be promoted by an appropriation running over a length of two or three years.

The CHAIRMAN. In other words, you think it would be desirable to have an appropriation fully covering the total cost of surveys, and then leave the Geological Survey a reasonable length of time.

Mr. NEWELL. Yes, sir. If you consider any large corporation or organization which is endeavoring to ascertain what they can do in such matters, they never try to rush through, but take plenty of time to mature the matter thoroughly. In the matter of the Croton dam, ten years were spent in making and discussing the plans and in ascertaining what methods were feasible. In the matter of the large dam for the municipality of Boston, years were spent in completing plans. In hydraulic works more than in any other enterprises great care and forethought must be exercised, for there is not the opportunity of repairing mistakes that there is in railroad construction or in anything else of that kind. If you make a mistake it must be paid for by future generations, either in life or in property. So that every large enterprise in the way of hydraulic work must be entered upon with reasonable deliberation, as is shown by the instances of all successful works of that sort.

Mr. BARHAM. Then let this committee, which is not an appropriations committee—let it authorize—and that is within its jurisdiction—a complete system of surveys. Let us authorize the work the same as is done in the Interstate and Foreign Commerce Committee and all the other committees interested in appropriations—the Rivers and Harbors Committee and all the others—and let us authorize it here; and do not let us say anything about an appropriation, but say “An examination is hereby authorized, not to exceed in cost \$2,000,000 or \$3,000,000”—whatever you think is going to cover the cost—say nothing about an appropriation. There is an authorization. Then the Appropriations Committee will call you in to ascertain how much you need next year for surveys—\$50,000, \$250,000, \$500,000, or whatever you need. From year to year you will appear before this committee just as you would do in regard to light-houses or those other things, in order to state what you can judiciously and properly use the next year in making surveys. And so you will commence at the foundation rock, and the whole system will be properly worked out.

Mr. NEWELL. Yes, sir. In March, 1888, a joint resolution was passed authorizing this work of which the chairman has spoken. We have gradually built up the work along those lines. The first year of which I spoke the appropriation was \$12,500; the next year it was \$24,000; the next year \$50,000, and the present year it is \$100,000. And we are building up along those lines as rapidly as we can develop good men and good methods and do it economically. Now, I understand the irrigation association desire that this amount be increased to \$250,000. Whenever the work is placed on such a basis, we will be able to push forward along the lines suggested and already embodied in the law. This is simply a question of getting sufficient funds to cover the great area affected by your action, which is an area larger than all civilized Europe.

A part of any such investigation involves the examination of underground waters, extending under an area of the Great Plains which is larger than that of France. Part of it involves the examination of reservoir sites, each of which is larger than that constructed by the city of New York or Boston, and upon which a number of years were spent in surveys. We do not propose to do it as thoroughly as that, but we do propose to do it thoroughly enough to stand adverse criticism.

The next step, if the Government is to do anything further than it has done, is to take up one of these projects, such as the San Carlos dam, and decide whether it is to be built or not.

MR. SUTHERLAND. Would we not need necessarily to have the information first, before Congress would authorize it or anything else?

MR. REEDER. It seems to me that we have already been four years right along that line, of finding out what we can do. Now, the proposition is to put in one of these dams and find out what is practicable, and then to continue right along that line.

MR. NEWLANDS. While you are getting practical results, do you think it is wise to have these large appropriations for a series of years, or to appropriate immediately for the construction of a few of those enterprises for which the plans have already been made, and to conduct also continuous investigations?

MR. NEWELL. Yes, sir. It seems to me we can take some one or more of these enterprises, the plans for which are available, which apparently would yield the largest results.

MR. NEWLANDS. With reference to these plans, it is suggested that the funds from the arid and semiarid States should be segregated, and a special fund should be created in the Treasury to be devoted to the work of irrigation and investigation. I would ask you whether the Geological Survey is ready to go ahead with both of these methods with practical results?

MR. NEWELL. Yes; we have a body of trained and skilled young men who have had experience in investigation and construction, and if the money was available for any one of these projects, the work would be started at once. At the same time I think it would be better to have the investigation continue as it has been, an item in the sundry civil bill, and devote the reclamation fund to the work of construction. We have arrived at this condition where Congress is up against the necessity for doing something. There is no longer any need of delay for further information regarding certain specific projects, for we have a number of those which are well matured and considered and can be entered upon to-day.

MR. BARHAM. Do you suppose that the other arid-land States and the other States in the Union are going to permit California to carry out one of these projects and knowing that there is no comprehensive system—everybody knows that this can be done; there is no question about it—but the question is, how much is the whole thing going to cost? You can not answer that, and nobody else can.

MR. NEWLANDS. Suppose when the first river and harbor improvement was proposed that that question had been raised. We want a comprehensive system of improvements here, of course. Three hundred and twenty million dollars have been spent on rivers and harbors. Suppose that when the improvement of our rivers and harbors was first suggested the statement had been made that those improvements would mount up to such a sum; it would have appalled the imagination.

MR. WILSON. Canal building alone has cost over \$300,000,000.

MR. NEWLANDS. Yes; and that sum would have been regarded as prohibitory of the whole plan.

MR. BARHAM. There is a lot of water that can be used yet?

MR. NEWELL. Yes, sir. That limits it in one respect. The private capital which can be put into this development will make possible an immense amount of construction which is now impossible.

MR. BARHAM. On the bill of Mr. Newlands we are legislating in advance of conditions. That is my judgment on that matter. We should first have all the facts before we undertake to legislate. In the very nature of things, before you have a completed project the Congress of the United States is not going to enter upon the irrigation of

the arid lands. We do not have to have them all in; that is not the purpose. But we are going to give the people of the United States the understanding that we are to irrigate all the arid lands that can be irrigated. We are going to enter upon a comprehensive system; we are not going into California because there is a little place there that can be irrigated, or into Nevada or some other State, but we are going to irrigate all the arid region, and it will take one hundred and fifty years to do it.

Mr. NEWELL. It seems to me that is comparable to saying that we should not improve New York Harbor before we know just how much every other harbor on the Atlantic coast is going to cost.

Mr. BARHAM. That is not the question, but we want the people of the United States to understand that we are going to enter upon a comprehensive system; that we are not going simply into any one little project such as that in California.

Mr. NEWELL. Is it not understood that if we create a reclamation fund and devote it to projects in first one and then another section, would not it carry with it the conclusion that the fund is available for all?

STATEMENT OF HON. FRANK W. MONDELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WYOMING.

Mr. MONDELL. I thank you very much, gentlemen, for giving me the opportunity to discuss the matter of reclamation of arid lands before the committee for a few moments. I want to discuss the subject from two standpoints, or along two lines; first, with regard to the general plan or system to be adopted, or which may be adopted, and second, with regard to the bill I have introduced, and which is before the committee, and is as follows:

[H. R. 14165, Fifty-sixth Congress, second session.]

A BILL Dedicating the proceeds of the sales of public lands to the construction of works in the aid of irrigation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this Act the proceeds from the sales of public lands, except such as are set aside by law for educational purposes, shall be used, under the direction of the Secretary of the Interior, for the survey and construction of storage reservoirs, diversion and other hydraulic works in the arid and semiarid regions, for the purpose of developing and making available the waters that now run to waste, for use in the irrigation and reclamation of arid lands.

SEC. 2. That the Secretary of the Interior is hereby authorized to make such surveys and examinations as may be necessary to determine the necessity for, and the practicability of, the construction of works for the purposes mentioned in section one, and may, upon such determination, after proper public notice, let contracts for the construction of the same; but no contract shall be entered into unless there shall be funds available as provided in section one, and no contract shall be entered into for any project the cost of which, when complete, shall exceed five hundred thousand dollars, without authority of Congress.

SEC. 3. That from and after the beginning of the survey of any project herein provided for, all entries made of public lands on which such project may be located, or which may be required for the construction and maintenance of such project, shall be subject to such use for the period of two years, at the expiration of which time such lands shall become subject to the entries aforesaid, unless in the meantime permanently reserved by law for the purposes aforesaid. That all filings, entries, and locations of land, desert in character, made after the tender for bids on any projects above referred to, and determined by the Secretary of

the Interior to be irrigable from the waters thereby rendered available, and from no other source, shall be subject to the requirements of the desert-land laws.

SEC. 4. That no contract shall be let for any of the works hereinbefore provided until the Secretary of the Interior shall have determined to his satisfaction that the State within which such works are to be constructed has provided an adequate system of laws for the public control of streams and the just and final determination of rights to water therefrom, which make beneficial use the basis, the measure, and the limit of the right, and administrative officers necessary to insure the delivery of the water rendered available to those entitled thereto.

The irrigation congress, of which you all know, and which has held annual sessions for many years, after a long discussion of the subject as to what the Congress of the United States would be asked to do by that congress, finally, in their platform last fall, decided to confine their request to Congress to the subject of storage and conservation of waters. They adopted as their motto "Save the forests and store the floods." Their resolutions were very brief. I was chairman of the subcommittee which drafted them; they were unanimously adopted, and are as follows:

We hail with satisfaction the fact that both the great political parties of the nation in the last campaign declared in favor of the reclamation of arid America in order that settlers might build homes on the public domain, and to that end we urge upon Congress that national appropriations commensurate with the magnitude of the problem should be made for the preservation of the forests and the reforestation of denuded areas as national storage reservoirs, and for the construction by the National Government as part of its policy of internal improvement of storage reservoirs and other works for flood protection, and to save for use in aid of navigation and irrigation the waters which now run to waste, and for the development of artesian and subterranean sources of water supply.

The water of all streams should forever remain subject to public control, and the right of use of water for irrigation should inhere in the land irrigated, and beneficial use be the basis of measure and limit of the right.

Now, the question of the irrigation of the arid lands of the United States, as we all appreciate, is a very large question. Beginning at the beginning and going through the whole process, down to where we convey water to all the lands that can be irrigated in the United States at a reasonable cost, is covering an enormous territory, in fact and in point of expenditure. Clearly, the diversion of the smaller streams which flow near the surface of the surrounding country and the distribution of their waters over lands for their irrigation is not a public work, it seems to me. The question then arises, What portion of the work to be done in connection with the reclamation of arid lands is national work? What part of the work may the Government undertake—constitutionally undertake? Although I am not a constitutional lawyer and do not pretend to be an authority on the Constitution in this particular, I am very positive in the opinion that the Constitution of the United States does not give us any authority to actually irrigate land or peddle water. But there is a work in connection with the reclamation of arid lands which, in my opinion, is a national work. What, then, is the line of demarcation between the work which the National Government should undertake and the work which should be left to the States, associations under the States, or to individuals? It seems to me the line of demarcation is where storage and conservation, including the diversion of large streams, ends and the actual distribution of water over lands begins, and that the work of conserving the waters of the United States, of making them available, so that the State, the corporation under the State, the individual, or the association of farmers may take up the work of actual reclamation—that that work is a national work.

MR. KING. Do you see any distinction between the power of the

Government to store and build a reservoir and to put in a large dam in Snake River, for instance, in Idaho, which is essential for the irrigation and reclamation of a vast territory? Is there any difference between having a dam to store flood waters and building a dam in a great river which is necessary for and which will insure the reclamation of extensive tracts contiguous to it?

Mr. MONDELL. I do not think there is a very great difference. Understand me, that when I refer to conservation I do not consider that conservation is fully carried out by the construction of storage reservoirs. There is a diversion which is a conservation. The construction of an enormously extended canal, taking the water out of a deep canyon and carrying it up to the level of the open country, is a work of conservation. It is a work of conservation because the length of the canal itself is a storage reservoir and also because the individual or the association of individuals under the State takes up the work at the end of the main canal, and the use by the individual completes the conservation of water. Now, we find when we go before Congress and advise reclamation, they say: "What is this scheme which you ask us to enter upon?"

Mr. WILSON, of Idaho. In regard to Mr. King's question, suppose you take the Snake River in Idaho, which flows through a deep box canyon for a long distance, so that it is practically impossible to get it out of that canyon to utilize in irrigation, and suppose the Government, say, should go there and dig and construct a reservoir there to raise the water to a point where it could be diverted and used; that would be, under your idea, properly under the head of conservation?

Mr. MONDELL. I should say so, and a national work. The members of Congress say to us, when we come before them in discussion of these matters and ask for appropriations, "What do you propose to do, and how far do you ask the Government to go; to what extent do you expect Government expenditures to be made for the reclamation of arid lands?" They say to us that there is no good reason why the Government should actually reclaim lands that are barren any more than it should actually drain lands that are wet, and their contention is sound. There is no stronger reason why the Government should supply water upon lands, except as the lands may belong to the Government, and the Government can enter upon the scheme with the idea of disposing of those lands—should irrigate dry lands—than that it should fertilize barren lands. But when you say that it is not our intent and purpose that the Government of the United States shall irrigate the lands, but that the Government shall enter upon the truly national work of making waters available so that private enterprise can place it upon the lands, then to a very considerable extent you eliminate their objection. The Government, in the case of a harbor which is absolutely useless and worthless because of a bar across its mouth, dredges the bar and makes the harbor available.

Mr. SUTHERLAND. What does the National Irrigation Congress believe should be done on the point you suggest; do they not think that we should go further than storing the water, or have they expressed themselves upon that?

Mr. MONDELL. I will say that there are some members of that association that think the Government might go further, but it was the consensus of opinion of that convention that that was as far as they could unitedly defend their proposition to Congress, and as far as the National Government would probably ever go, although there were some members in that Congress who would appreciate it if the Govern-

ment would still go further. To illustrate the point I wish to make, in river and harbor work the Government takes a great stream running through several States, with stretches of navigable water, but with bars and shoals between those stretches, and it dredges the mouth of the river and the bars and the shoals and makes it available for the purpose of navigation for which nature intended it. It does not make a river out of dry land, but simply perfects nature's work. Now, that is national work. I believe it is likewise a national work for the Government to perfect the work of nature in the arid regions by making available for irrigation every drop of water in those regions.

MR. NEWLANDS. You contend for that entirely apart from the Government's ownership of the adjoining lands?

MR. MONDELL. Yes, sir; entirely without any reference to the Government ownership of the adjoining lands. Of course, the fact that the Government owns the greater portion of the land in the regions where we propose to conserve this water is a very strong argument, an exceedingly strong argument, in favor of this work. The fact that the Government has 550,000,000 acres of land which, under present conditions are largely barren, which can not be thickly settled, is the strongest kind of an argument in favor of the Government assisting in making it possible to irrigate those of these lands which are irrigable and thus make all the lands more valuable. But beyond that the Government owes it to its own development, extension, and growth in population and wealth to see that a region now barren is made fruitful, not altogether by the Government's expenditure, but largely by the expenditure of the individual after the Government has made expenditure in irrigation development possible by making the waters available.

MR. WILSON, of Idaho. Is it not a fact in history that every nation having arid lands in its domain, except the United States, has in a national way aided in their reclamation in some way or other?

MR. MONDELL. I think that is true, but I think that largely the work of the governments has been work of the character I now refer to and not the actual work of diversion and reclamation. Now, as to cost, we come before Congress and they say, "How much will it cost, and how far are you going?" If we can say that we propose to enter upon a system of conservation to make available by the construction of storage reservoirs and the diversion of large streams all the water that now runs to waste, there is a limit placed, and a tangible limit placed, to the Government's expenditures. Then they say, "How much will it cost?" It is difficult to say how much it will cost, but some reasonable estimate can be made. If you stop at storage and large stream diversion it is not a difficult matter. I think that Mr. Newell will bear me out that it is possible to make a very fair guess as to what a comprehensive system of storage will cost in the United States.

MR. WILSON, of Idaho. In that connection it is estimated that about 75,000,000 acres remain yet to be irrigated. Of course that is a rough estimate, perhaps 25,000,000 acres one way or the other. It is a vast acreage, however. I know in my State in particular a good many millions of acres can yet be irrigated from the streams without any storage, so that when we estimate what it will cost in order to irrigate 75,000,000 acres we should deduct the amount that the streams placed there by nature will yet irrigate before the necessity arises for consuming that which we will provide.

MR. MONDELL. I am glad you mentioned that. To take the area in

the arid region susceptible of irrigation as a basis and estimate the cost of conservation of a sufficient quantity of water to irrigate such an area is to place the cost of the work which the Government should undertake altogether too high. Even if it were necessary to aid in the reclamation of every acre susceptible of irrigation and remaining unirrigated in the arid region by storage, it would not be necessary to store a sufficient amount of water for their complete irrigation, for in all properly developed systems much water is made available besides the water stored; the stored waters being used simply to supply the deficiency of the waning stream in the latter part of the crop season. Then there are the large diversions in which the work of the National Government should only extend to carrying the water to a point where it will be available for distribution by private enterprise. These diversions would be very cheap compared with the amount of water made available for irrigation purposes.

In addition to that, as Mr. Wilson very properly states, there is a considerable area yet remaining in some portions of the arid region that may be developed by private enterprise without any Federal aid either in diversion or conservation. These areas are distant from lines of communication and in regions where there has not been much demand for irrigated products, and their development will come slowly; but the fact that there are such areas does not in any degree abate the necessity for Federal aid in those regions where private enterprise has now reached the limit of irrigation development.

MR. NEWLANDS. And there is a great deal that can be irrigated by the flood water.

MR. WILSON, of Idaho. There are hundreds of thousands of acres irrigated by the Snake River, and yet it is impossible to notice that the volume of that river has been decreased to any appreciable extent. I imagine there are hundreds of thousands of acres—and perhaps a million acres—on that stream that can be irrigated.

MR. MONDELL. I am speaking of the question in a large way when I say we are not as yet to the limit of the development in certain regions by State and private enterprise. In my State irrigation development is going on quite steadily. We have laws, State and national, under which ordinary diversion and distribution, in my opinion, can be taken care of. For instance, in addition to the laws under which small associations of farmers take out a canal from a small stream and irrigate their joint holdings, we have the law of Congress known as the Carey Act, which has been much misunderstood. Under that act enterprises can be undertaken which individuals and small associations of farmers could never undertake. The efficiency of the act depends upon State legislation. In my State, the home of the man whose name the act bears, we were early to take advantage of the act, and we are to-day engaged in the work of diverting large streams. We have one enterprise in my State whereby we will irrigate 85,000 acres of land and others in contemplation whereby there will be irrigated more than 150,000 acres of land. These tracts will be irrigated without storage.¹

STATE DESERT-LAND SEGREGATIONS.

By section 4 of the act of August 18, 1894 (28 Stat. L., 372-422), provision is made for the donation, to each of the States in which there may be situated desert

¹ Extract from the Annual Report of the Commissioner of the General Land Office for the year ending June 30, 1900:

lands, of not more than 1,000,000 acres of such land as the State may cause to be irrigated, reclaimed, occupied, and cultivated by actual settlers. This act has been amended by a provision in the act of June 11, 1896 (29 Stat. L., 413-434), to the effect that a lien is authorized to be created by the State upon the lands segregated, and that when an ample supply of water is actually furnished to any tract or tracts thereof patent shall issue to the State for the same, without regard to settlement or cultivation.

During the year two lists have been filed by the State of Idaho, one list by the State of Montana, and one by the State of Wyoming. Several lists previously received have been refiled during the year. All of these lists have been duly acted upon. One list filed by the State of Idaho, aggregating 51,005.92 acres, was approved. The State of Wyoming filed two lists of lands for patent, which have been duly acted upon, and one patent for 3,855.25 acres of the same has been issued.

Mr. NEWLANDS. Nevada has never been able to do anything under the Carey Act. We have absolutely reached the limit of diversion. We divert all the water flowing into the river during the period of drought, and that is the limit of cultivation.

Mr. MONDELL. I am not fully informed as to conditions in Nevada, but, having had some experience of the workings of the Carey Act, I believe it is applicable to diversions of considerable size and to the distribution of water over considerable areas, where the initial cost is entirely beyond private enterprise and the law embodies the essential feature that lands must be irrigated, cultivated, and settled in small tracts.

Mr. NEWLANDS. In Nevada we can not get along without storing; that is the essential thing for any further reclamation.

Mr. MONDELL. That merely accentuates the fact that conditions vary in the arid region; we also have reached the limit of development without storage in some parts of Wyoming.

Mr. BARHAM. It applies directly to the proposition you are going to make.

Mr. MONDELL. Yes, sir; it accentuates the fact that conservation is a national work and ordinary diversion and distribution is a local work, and the two classes of enterprise should never be confused or confounded. The United States Government should undertake the one and the States and individuals and associations should undertake the other.

Mr. WILSON, of Idaho. Storage alone would not cost more than half as much as storage and distribution paid by the local governments.

Mr. MONDELL. Yes; and I want to say that when you enter upon the question of the cost of actually conducting water upon the lands and fully irrigating arid America you are entering a calculation that is beyond possibility of present computation; 75,000,000 acres of land in these United States, now susceptible of irrigation, in my opinion will never be irrigated in their entirety without the expenditure of at least \$20 an acre; but the principal portion of this expenditure will, of course, be by private enterprise. The work of making available for use by private enterprise the water not now available would cost but a fraction of the total cost of the reclamation of the lands by irrigation.

The CHAIRMAN. Supposing that could be done now, at once, and 75,000,000 acres that are now arid and nonproductive could be made productive by the expenditure of a very large sum of money, what would be the effect on agricultural products?

Mr. MONDELL. I will say, upon that question, that it is one that opens a very wide field for discussion, and it is scarcely worthy of discussion, for the reason that if the Government of the United

States should make appropriations of \$5,000,000 for irrigation, we could not use that amount for a number of years, economically. Reclamation must necessarily be slow, and through whatever agency it comes, it will never come as rapidly as the increasing demand for products in this country comes, by reason of the increase of our population.

Mr. NEWLANDS. It can not increase as rapidly as the population of Nebraska, and Kansas, and the Dakotas under the preemption laws.

Mr. MONDELL. We disposed of more acres of land under the preemption and homestead laws alone in twelve years than the entire domain in the arid regions susceptible of irrigation, and practically every acre of that ground would produce a good crop of wheat, corn, or cotton by simply turning it with a plow. We extended with that rapidity in the seventies and early eighties. There is no possibility of rapid development in the arid regions, no matter how earnestly we press that development, and no matter how Federal appropriations may help us, there is no chance of our increasing the agricultural products as fast as the demand for those products increases. If, then, this committee shall decide—and this is the committee to make that decision—the work which it shall recommend to Congress shall be the work of conservation by the construction of storage reservoirs, by diversion when diversion results in conservation, and when it is not diversion entirely for the purpose of carrying waters directly upon the land—if this committee shall decide that this is to be their recommendation to Congress, then you have clearly defined the scope of the work and limited the possibility of appropriation.

The CHAIRMAN. I will ask you one or two questions on that point. Your argument on that policy is based on two or three grounds. One is that it would limit the scope of the work. Another is that the storage is a national and distribution a local work. Another still is, that the Constitution would warrant storage without any distribution. I do not understand very clearly the difference between the last two questions. I am not sure that I know any distinct provision of the Constitution that would authorize us to store water that would not authorize to convey the water to public lands, at least.

Mr. MONDELL. I will say that I do not know of any distinct provision of the Constitution which authorizes the General Government to make any expenditure directly or indirectly to encourage the irrigation of the arid lands. I hope and believe there is a broad power in the General Government to do it.

Mr. BARHAM. It can be done under the general-welfare clause.

The CHAIRMAN. Yes; the provision that Congress shall pass all needful regulations for the government of the Territories and other "property" of the United States. But I am not able to see the distinction between storing water and conveying it onto the lands where it is to be used. It must come under the general power of the United States, unless it comes under the general welfare, but I am not able to see the difference between storing the water and conveying it down through canals to the lands.

Mr. MONDELL. There is a vast difference, in my opinion.

Mr. NEWLANDS. Considering the constitutional question, I think we all agree that throughout the arid region the duty of the Government is discharged when it conserves the waters and leaves the distribution to local individuals.

Mr. MONDELL. In speaking from a constitutional standpoint, and speaking of the general policy, I think there is a wide difference—as

wide as the poles. The conservation of the waters makes available for use all lands which nature so placed that they can be irrigated from a stream: makes possible the use of all the waters nature has provided for the irrigation of that land. The distribution of water, on the other hand, makes the water appurtenant to certain specific lands. The first class of work can only be carried out successfully through public agencies, and as it must be accomplished in order to make vast areas of our country habitable by any considerable population, the Government should undertake it in the interest of the general welfare. It does not interfere in any way with any law, rule, or regulation of the States relative to the use of water.

The second class of work can be accomplished in most instances by private enterprise, and that puts it out of the category of public enterprise, if nothing else does. In the first instance, the National Government makes available the waters of the arid region as it makes available the navigable waters of the humid region, and in doing so it does not interfere with individual enterprise in any particular, or enter into conflict with laws or regulations of the States. But if you enter upon a plan of distribution of water by the General Government and actual irrigation of specific lands, you do threaten national conflict with State water laws and discredit individual enterprise which is engaged in the business of irrigation of lands. If the Government proposed to divert ordinary streams and carry them upon lands and enter into the business of selling the waters, you immediately invite conflict with State laws, put a damper upon every corporation and individual or association of farmers, because they hang back, hoping that the Government will take up their particular plan, or fearful that the Government will take up their particular plan. It will retard the development of the arid lands, instead of encouraging development in the arid region, for the Government to enter upon the purely paternalistic work of distributing water and irrigating specific lands.

Mr. BARHAM. Charging a rental?

Mr. MONDELL. Yes, sir; charging a rental.

The CHAIRMAN. Evidently I have succeeded in misunderstanding, or being misunderstood by, the gentleman from Wyoming. I would say that I see the advantage of the policy you advocate in regard to the storage. But I am inclined to think you weaken your argument by bringing in the second point in regard to the Constitution, and I wanted to bring you out on that point.

Mr. MONDELL. As a layman I should not have referred to the Constitution in the presence of constitutional lawyers, and so I beg pardon for having done so.

The CHAIRMAN. On the question of public policy, I have been very much interested in your argument.

Mr. NEWLANDS. You favor the storage of water by the Government?

Mr. MONDELL. Yes, sir.

Mr. NEWLANDS. And your scheme of conservation does not consist, then, of merely impounding the waters, but also in carrying the waters to the point where private enterprise can commence, leaving distribution and reclamation to the enterprise of corporations and private individuals.

Mr. MONDELL. My idea is that the line which should be drawn is where the work of making water available for use in irrigation ends and actual utilization of such water for the irrigation of specific tracts begins. Where the enterprise is beyond all possibility of individual

construction and diversion results practically in conservation, then it is a part of a conservation scheme.

Mr. NEWLANDS. Now, as to the appropriations, it is your contention that an appropriation should be made just as river and harbor appropriations should be made—without any view to compensation to the Government directly for the work done; is that so?

Mr. MONDELL. I was just coming to that point, and I will answer the question now. I am glad you referred to it. My individual opinion, Mr. Chairman, is that the Government should never expect a dollar's return for its expenditures in the conservation of the flood waters of the country, any more than it now expects a return for the conservation of waters in the protection of the forests in forest reserves, any more than it expects a return, although it makes enormously valuable the property of individuals, for dredging out rivers and harbors; that this work should be undertaken purely as a national work for the development of the country. It does not make it a penny cheaper or easier to develop an arid waste to have the Government conserve the waters that now run to waste; it simply makes it possible for private enterprise to do so to utilize all the water which the Almighty has placed in the arid region. However, if it shall be the opinion of the committee and of the Congress when they enter upon this work that the Government should in some instances—because the conditions vary very greatly: the conditions of Nevada are very different from those in Wyoming—if it be the opinion of Congress that the Government should be partly or wholly reimbursed, then we come to the question of the method of reimbursement. In enterprises of conservation it is difficult to fix the charges as you could fix them if you were undertaking simply a work of distribution. Reservoirs, it has been demonstrated by practice (and I think common sense would also lead us to that conclusion) should be used as works for the purpose of maintaining a uniform flow of water in a stream throughout the irrigation season. It is difficult to say just what effect the storage of water has on specific tracts along the stream. It depends largely on the character of the country through which the stream flows, so that an attempt to attach water stored at the head of a perennial stream to a specific tract of land is not practicable, and it is not scientific, for the reason that any storage project not only makes available the water stored, but makes available an infinitely greater volume of water which is not stored. Here are some plats illustrating the flow of streams, prepared by Mr. Newell. This illustrates the flow of the stream. We will say that the irrigation season begins in May—just an illustration; it ends in August; now the amount of water available in that stream under present conditions is the minimum flow at the last of the irrigation season. All of the enormous volume occurring in the earlier floods runs to waste, because only the amount of water can be successfully used which flows during the entire irrigation season.

Mr. WILSON, of Idaho. That is subject to the exception of spring crops.

Mr. MONDELL. Yes; but I am speaking in a large way. There are regions where we simply flood grass lands in the spring and get a fair crop. That is but a poor irrigation at the best.

Mr. WILSON, of Idaho. Yes; but in regard to the fruit crop?

Mr. MONDELL. Yes; that is an exception. Now it is simply necessary to reservoir a sufficient quantity of water at the head of a stream to reenforce the waning flow, and for every acre-foot of water you conserve from 1 to 2 acre-feet is made available in addition.

Mr. NEWLANDS. I quite agree with you that the effort should be to keep an equal and sustained flow in the river, and that it is not desirable for the Government to go into the system of distribution. How would you get compensation?

Mr. MONDELL. If there is to be a return of the expenditure it seems to me that while some return might be had from public lands benefited, the major part of the expenditure, if returned, should be secured from water benefits.

Mr. NEWLANDS. You would fix that charge upon the land or the ditches?

Mr. MONDELL. Upon those using the waters made available for use by the Government expenditure.

Mr. NEWLANDS. How would you measure it?

Mr. MONDELL. As you ordinarily measure water, by cubic feet per second.

Mr. NEWLANDS. You would make that charge so as to fully compensate in a period of years, or make it a perpetual water right?

Mr. MONDELL. If it is thought that the Government should be reimbursed, then, of course, the amount charged against the users should be proportionate to the amount used. It would be a mistake to make it a perpetual charge, because if there is any one thing that I am not in favor of, it is a perpetual charge for water by anybody—the Government, a State, or companies. That, of course, is only a personal view; the right should be perpetual.

Mr. NEWLANDS. Of the ways in which the Government can get compensation, one is to increase the price for the land while under reclamation through storage; another is through a sale of water rights, and a third is a sale of the water itself, measuring it in cubic feet.

Mr. MONDELL. If it is to be a sale of water rights, the right should be expressed in cubic feet.

Mr. NEWLANDS. Which one do you recommend?

Mr. MONDELL. The first plan would only be possible on a fair basis where all the lands to be benefited by projects were Government lands. I do not see how you can possibly arrive at it. It is a bad theory and impossible in practice.

Mr. BARHAM. The first is what?

Mr. MONDELL. As I understand it, the placing of a charge upon the Government land under a project high enough to get back the money expended.

Mr. NEWLANDS. No; with a view to determining what amount of land can be brought under reclamation, and having ascertained the total amount, say 50,000 acres, fixing such a price per acre as will give you a compensation in ten or twenty years.

Mr. MONDELL. We must remember that on many of the streams of the country more than the present average flow during the irrigation season has already been appropriated, and if we increase the average flow the increase will not all be used to irrigate public lands, but will be, to some extent, used to irrigate land in private ownership; and therefore it would seem that the return should come from those benefited, whether using the waters to irrigate lands newly taken up under the land laws or the lands already in private control. Now, if the Government built reservoirs with a view to irrigating only new lands on a stream where there are now lands under private control partly irrigated, what would be the effect on the people whose lands are already under irrigation and who do not have enough water now?

Mr. NEWLANDS. I am not contending now that these waters should

be applied to particular lands. I am suggesting how the Government shall receive compensation for the sum expended in storage, whenever it can ascertain the additional number of acres which can be reclaimed, and put such a price on that land as will compensate the Government. Assuming that the Government is to be compensated, would you prefer that the land price should be raised, or that the compensation should be received from the actual sale of the water itself?

MR. MONDELL. I would say, that except under projects where there is no present irrigation on the stream or land in private ownership, except in such a case it would be impossible to settle upon a scheme of land values that would be just as a basis of reimbursement; if the Government is to be reimbursed, it seems to me it must be by a charge for water rights.

MR. BARHAM. What kind of a bill do you think it would be best to re?

MR. MONDELL. I hope we may be able to secure a direct appropriation with which to begin the construction of at least one project. It seems that Congress is willing to give us thousands for investigation, but not a dollar for construction. It is against this policy of Congress that I chafe. If we can not secure consideration for a comprehensive plan, let us insist upon some provision being attached to the river and harbor appropriation which will give us a start. We have the projects in Colorado and Wyoming, which have been carefully surveyed and estimated by the War Department.

MR. KING. Could you give us the status of the Gila River proposition?

MR. MONDELL. That is a proposition on which we may have an opportunity to vote later, and my only regret in connection with it is that instead of providing \$100,000 for a further survey it does not appropriate \$100,000 to survey and construct. We are constantly being asked, "How far are you going, and what do you intend to do?" To meet that query I have introduced a bill (H. R. 13847) which simply provides that the Geological Survey (I admit that I think we have had plenty of surveys to begin with, but Congress does not agree with us in that direction)—that the Geological Survey shall proceed to make an investigation of the entire question of water conservation throughout the arid region, with detailed investigation and survey and estimate of a project in each one of the arid and semiarid States; and if there is a locality where the Geological Survey thinks irrigation can better be accomplished by artesian wells than by storage, I should recommend that they ascertain the limits of the artesian basins, and report fully to the next Congress on these matters so we may have a basis for future legislation.

(Thereupon the committee adjourned, to meet on Thursday, February 7, at 10 o'clock a. m.)

WASHINGTON, D. C., *February 7, 1901.*

The committee met at 10.15 o'clock a. m., Hon. Thomas H. Tongue in the chair.

Present, in addition to the members of the committee, Hon. Francis G. Newlands, of Nevada; Hon. J. F. Wilson, of Arizona; Elwood Mead, irrigation expert of the Department of Agriculture, F. H. Newell, hydrographer of the Geological Survey; George H. Maxwell, chairman

of the executive committee of the National Irrigation Association, and Gifford Pinchot, chief forester of the Department of Agriculture.

Mr. NEWLANDS. I suggest that Mr. Pinchot make a statement regarding forest preservation as an essential part of any scheme of arid-land reclamation.

STATEMENT OF GIFFORD PINCHOT, CHIEF FORESTER OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

Mr. Chairman, the essential thing I want to say is that the policy of conserving water for irrigation by the Government was begun in the act of March 3, 1891, which directed the President of the United States to reserve lands in whole or in part covered with timber. The forest-reservation policy thus inaugurated was carried out, first, by President Harrison, who made some 13,000,000 acres of forest reservations, followed by President Cleveland, who made some 27,000,000 acres of forest reservations, and has been continued by President McKinley since; so that the total area now within forest-reservation boundaries is about 47,000,000 acres. These reservations were made for two purposes, the chief of which at present is the conservation of water and the other the perpetuation of the supply of wood. The Federal Government makes an appropriation of \$300,000 a year, expended through the General Land Office, for the protection of these forests, for these two purposes, and a second appropriation of \$150,000 a year, expended through the Geological Survey, for the survey, mapping, and description of these reserves, also with the ultimate view of protecting them; and a third appropriation, of \$88,520, expended through the Department of Agriculture, a portion of which is also devoted to the study of these reserves for the same purpose. Consequently, in forest matters the policy of the United States to expend money for the protection of irrigation is well fixed. A forest is essentially a storage reservoir, and consequently the policy of Government storage reservoirs is not a new one.

Mr. BARHAM. The Government pays out now nearly \$500,000 a year for the protection of forests which are storage reservoirs; is that the substance of the statement?

Mr. PINCHOT. Yes; for the protection of storage reservoirs in the West.

Mr. BARHAM. If you allow me to suggest it, it seems to me that your statement up to this time will not be very clear to people who do not understand what you are talking about. "Forest reserves," "Conservation of the water for irrigation"—now, they do not know what you are talking about. Can not you explain that so when a man reads your statement he will know what you are talking about? We ourselves know exactly what it means; but I can give a number of illustrations, and you can, undoubtedly, give many others of the importance of the preservation of the forests and what that amounts to in conserving water.

Mr. PINCHOT. The protection which forests offer against evaporation by their shade, by breaking the wind, and by their creation and protection of a soil cover, makes them natural storage reservoirs for water.

The crowns of the trees shade the ground from the sun and wind. They also form the forest floor with their litter of leaves and twigs, and this mass of decaying tree refuse is the most important element

in retarding evaporation and surface flow. This vegetable mold prevents whatever sun and wind that pass the tops of the trees from reaching the soil, besides being of a very spongy nature itself.

When rain falls upon a forested area, a great deal of it is caught by the leaves on the trees and held for a time before it reaches the soil. The ground litter also keeps some of the water in it for periods which depend upon its depth and quality. When there is so much rain that the soil is too wet to absorb more, the obstruction which the trunks of the trees and the forest litter offer has considerable influence in keeping the water from at once rushing off into the streams.

The destruction of the forest removes the source of the litter. Without tree tops or ground cover to intercept the drops, rain soon pounds the upper soil into a compact mass which water can not penetrate easily, thus forcing it to flow away over the surface at once. There is also no longer the obstruction to this surface flow which the tree trunks and litter of leaves and twigs formerly afforded. The result is that the water which falls upon the denuded land has nothing to prevent it from flowing right away. In its downward course it washes the land and carries much soil away with it to be deposited on the level, lower land below. In the high altitudes where snow gathers the influence of the forest is both in shading the snow from the sun and wind and in keeping it from sliding down into streams.

MR. MAXWELL. Is it not a fact that the preservation of the forests, not only of the trees but the protection of the surface of the soil by the undergrowth and grass and everything which is a part of the forest growth, is very necessary to prevent the washing of debris in the reservoirs?

MR. PINCHOT. It is essential. Not only is the forest a storage reservoir itself for the distribution of water, the conservation of the supply, but also it acts by its numerous roots and protecting cover as a blanket for the loose soil holding it from being washed into the streams and caught in the reservoirs. No system of storage reservoirs built on any watersheds not controlled by forest can be permanent. The chief danger to any storage-reservoir system is that the reservoir itself will be filled up with silt. This is not a theoretical statement; it is based on a large number of known cases in which very expensive irrigation works have been entirely ruined by the deposit of silt, and the only known means of protection against that is the maintenance of forest on the watersheds. Forest destruction above storage reservoirs is uniformly followed by serious damage or destruction of the reservoirs themselves.

MR. MAXWELL. Your idea is that the preservation of the forest is a preventive?

MR. PINCHOT. Exactly. Forest destruction causes silting, and forest preservation stops it. Danger from that source can be obviated by a proper system of forests, and that is the only way in which it can be obviated.

MR. BARHAM. Can not you put that in a little plainer way? Now, by way of illustration, take a place where a forest has been cut off. When the waters fall, as they do in our section of the country, the water coming down in torrential streams—and I suppose in almost all the arid regions they are torrential streams—that forest being all gone and the underbrush being gone, the accumulation of loose dirt, rocks, and stone and debris from the destruction of the timber, and all that kind of thing, goes down into the reservoir that you have built. I know in California the great canyons have been filled up; they will

mine on either side of these canyons and on the little streams that run into these canyons. They will fill up 30 or 50 or 100 or 300 feet deep. Now, when the torrential storm comes on the whole thing, 150 or 200 feet deep, is swept out as clean as it could be and carried into the navigable river below or upon the farms below. It would be precisely the same, it seems to me, with a reservoir, if you do not have the underbrush or the trees or forests to prevent this silt coming down—this debris, this sand, and dirt coming down—and the first thing you would know you would not have any reservoir, or rather a reservoir of sand and dirt and pebbles and rocks and stumps and logs and everything that is loose which would go down into that and fill up the reservoir.

Mr. PINCHOT. Precisely. Your reservoir would no longer hold water. I am familiar with one that filled up so completely that a canal had to be dug through it.

Mr. MAXWELL. I remember an incident as to some forest in the mountains of southern California where the ashes and silt from the fire came down and left great banks of it.

Mr. PINCHOT. A more recent fire in southern California gives a still better illustration. There are two canyons, side by side, in the San Jacinto Forest Reserve, one of which was burned out. The area was as 1 to 29. The smaller one was burned out. A heavy storm occurred after the fire, and immediately after the storm the canyon whose area was one was discharging more water than the canyon whose drainage area was twenty-nine times as great.

Mr. BARHAM. Judge Wilson, of Arizona, is here and desires to be heard along the same line. He has only a few remarks to make, I understand, and then will extend his remarks in the record.

STATEMENT OF HON. J. F. WILSON, DELEGATE FROM ARIZONA.

Mr. WILSON, of Arizona. I simply want to get the points which my bill brings out before you.

Mr. BARHAM. How long would it take you to do that?

Mr. WILSON. I suppose about twenty minutes—it may be longer. I will be brief as possible, however. The bill concerning which I wish to speak is as follows:

[H. R. 3733. Fifty-sixth Congress, first session.]

A BILL to authorize the construction of a reservoir near San Carlos, Arizona, to provide water for irrigating Sacaton Reservation, and for other purposes.

Whereas the Indians located upon the Sacaton Reservation have, since time immemorial, supported themselves by agriculture through utilizing for irrigation the waters of Gila River; and

Whereas these Indians have at all times been friends of the whites as against the attacks of the Apaches, and through this fact the whites have been encouraged to settle near the reservation and utilize the waters of Gila River; and

Whereas the development of irrigation along Gila River consequent upon the settlement of the public lands has diminished the flow in that stream until the Indians have been deprived of water and are forced to become dependent upon the charity of the Government for food; and

Whereas this deplorable condition has existed for a number of years and has been called to the attention of the Indian Office from time to time, and as a result investigations have been made, a preliminary report being published in Senate Document Numbered Twenty-seven, Fifty-fourth Congress, second session; and also in Water-Supply and Irrigation Paper Numbered Thirty-three of the United States Geological Survey; and

Whereas the result of these investigations shows that water can be obtained in an economical manner only by means of storage reservoirs; and

Whereas suitable locations for these have been found at a number of places—notably at The Buttes, Riverside, San Carlos, and Guthrie, and also on Queen Creek—and an examination of all these, and comparison of costs and benefits, shows that the San Carlos location is to be preferred; and

Whereas the conclusions of the engineers and experts employed in the investigation are that a masonry dam can be built at San Carlos, forming a reservoir of two hundred and forty thousand acre-feet capacity, and that the water supply is ample to fill such a reservoir in years of minimum flow, and that the volume of storage will irrigate at least one hundred thousand acres in addition to the irrigation of the lands of the Indians; also that it is feasible to increase the height at least seventy feet, forming a reservoir whose ultimate capacity would be approximately five hundred and fifty thousand acre-feet; and

Whereas by the construction of such a dam a portion of the lands on the San Carlos Reservation will be flooded: Therefore,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior be, and he is hereby, authorized and directed to take the necessary steps to secure title to the Government for the lands to be flooded or needed for the purpose of reservoir construction and for line of canal from the reservoir or reservoirs, and that any lands now the property of the United States needed for this purpose, or the value of which is affected, be segregated and removed from entry and settlement.

SEC. 2. That for the purpose of sounding for bed rock at the foundations of the proposed San Carlos dam, for preparing detailed plans and estimates, and for beginning the construction of foundations and the completion of said dam or dams, the sum of one million dollars be appropriated, to be expended under the direction of the Secretary of the Interior; and that the said work shall begin as early as possible, and shall be prosecuted to completion without delay.

SEC. 3. That this act take effect and be in force from and after its passage.

This question has been before the Committee on Irrigation of Arid Lands for nearly two years. Hearings upon top of hearings have been had by this committee, with a view of obtaining complete knowledge of the facts back of the proposition that the dam should be built. After exhausting the testimony on the subject and an investigation of all the facts, the committee has reached the conclusion which is formulated in the report, which I will now read:

REPORT BY THE COMMITTEE ON IRRIGATION OF ARID LANDS ON THE PROPOSED DAM ON GILA RIVER, ARIZONA.

Your committee find that the Indians known as the Pima Indians are located on the Sacaton Indian Reservation, on the Gila River, in the Territory of Arizona, some 20 miles below Florence, in Pinal County. They and other Indians with them, mainly dependent upon the products of the soil coming from that reservation, are in number about 8,000. These Indians from time immemorial have occupied this particular section now known as the Sacaton Reservation, which contains about 50,000 acres of land, 30,000 of which is the most productive soil of the valley, and have supported themselves by agriculture by utilizing for irrigation the waters of Gila River. They have always been the friends of the American people, and at times, when the savage warrior made it dangerous for the Americans and pioneers in that country to be there at all, because of their cruel warfare, they became the defender of the white man against the fierce Apache, and their reservation was a safe retreat for him; and now their chief boast is that not one of their tribe has ever stained his hands in white man's blood.

As civilization progressed and that country became settled, the lands of the Gila River have been taken up by the white settlers above this reservation, who bought them from the Government, which lands carried water rights, etc., and they have appropriated the waters of the river as they flow naturally down the stream, until now these Indians have not sufficient water to irrigate exceeding from 1,000 to 2,000 acres of their land in the dry seasons. With sufficient water, which they crave so much, to irrigate the lands which they desire to put into cultivation and to till, these Indians would be able to cultivate and raise products of the soil sufficient to pay all of the expenses to which the Government has been put on their

account, and to create a sinking fund in the Treasury besides. In other words, it would take them off the expense list entirely, and that is great.

And if the Government has the right to convey these lands to the white settlers, who take them up and make them homes for the people, it has the right also as guardian of these Indians to make the lands sufficiently productive to take the Indians off the expense list of the Government, which now costs about \$70,000 a year.

The Government of the United States now has appropriated through Congress \$30,000 for their maintenance, simply to feed them, while the other expenses which the Government must bear on their account amounts to about \$39,000 a year, making the expense about \$70,000 every year that the Government must bear on account of these Indians, all of which would be avoided if this dam should be erected and the reservoir constructed as provided in the bill.

That it is practical and would be profitable to the Government to build this dam seems to have been established by the Government's experts who have investigated the facts concerning it. The preliminary report published in Senate Doc. No. 27, Fifty-fourth Congress, second session, and also in Water-Supply and Irrigation Paper No. 23, lately published by the Geological Survey, show plainly and conclusively that it is practical and that it would be profitable to build this dam, and that it should be built and this reservoir constructed.

Your committee also find it to be an established fact that the dam when built to the height of 150 feet, which it may be, will hold when full 247,000 acre-feet, or water enough to cover that number of acres a foot deep. If raised 70 feet higher, which it may be, it would contain 550,000 acre-feet.

This outlay will cost a little less than \$1,000,000, or not exceed that amount, the amount carried in this bill. When completed there will be water enough saved for distribution, on an economic basis, in the dry season when water is needed, that could not be obtained from the stream, to irrigate the 30,000 acres of easy irrigable lands of the Indians to the effect heretofore stated, and have a surplus of water sufficient to irrigate at least 140,000 acres besides.

This surplus would be at hand were the dam raised but 150 feet; and when raised 70 feet higher that surplus would be nearly enough to irrigate a half million acres. There would be sufficient water in this surplus, at a fair price, far below what white settlers now pay for water rights, to place all of their lands already purchased in a high state of cultivation, and to reach and reclaim much of the now Government land undisposed of, which might be disposed of to the white settlers at a reasonable price per acre with the water rights attached. These, all taken together, would reimburse the Government for its outlay in less than ten years. This being done would take the Indians off of the expense list of the Government—they would be made self-sustaining. Hundreds of thousands of acres of now idle land would be reclaimed and hundreds of homes made for the white settlers, and great wealth thereby added to the already existing wealth of the country.

On the general topic I maintain the Government should reclaim its arid lands, and on this I say that money expended for the reclamation of arid lands will result in a still greater growth and a still greater development, greater production of wealth than any other single enterprise in which the Government may embark. I have the data here, the figures showing what has heretofore been expended on other enterprises less important than this one.

Therefore, by your consent, and having your undivided attention, appearing for that brave people in my portion of the West who braved the dangers of the West, then inhabited by savage tribes, living under the burning sun, where the bird was without song, and who put their hands on the savage mane and led him from bloody plains of savage warfare to safe fields of industry and homes of civilized quiet peace, I proceed to the detailed statement of facts and give them as reasons why the Government should undertake to reclaim these arid lands. I submit also that these facts, grouped as argument, are more cogent and strong than any facts and arguments that were ever offered at the beginning of the governmental action in building internal canals for internal commerce.

I apprehend that anyone who has not given particular attention to this question has no idea of the amount of land to be disposed of by the General Government. The Land Department, up to a few years ago, had not the slightest conception of it itself. Only about twenty-five years ago we heard from the Secretary of the Interior that there were perhaps 10,000,000 acres of public lands for sale; and yet since that time there have been over 150,000,000 acres sold, more than twice the area of the Republic of France; and since the investigation has been carried to its limit it has been found that there are more than 567,000,000 acres of Government lands subject to its disposition to-day.

Of that 567,000,000 acres of public lands subject to the disposition of the Government there are 541,265,248 acres of it in the arid West, in the 15 States and Territories in the Union known as the arid region. An equal distribution of these lands among the several States, situated as they are, side by side, makes it a matter of inquiry as to whether or not it is not policy for the nation to take charge of them and place them in condition for sale to possible home seekers of the Union, in which over 76,000,000 of our people live and to whom the lands belong.

I believe in equal distribution; and perhaps it is difficult to understand how the public land can be distributed in order that we may advance the theory that the distribution and reclamation of so vast a territory should be a national affair.

The reclamation of the arid lands should be by the Government, because of the immensity of the amount to be reclaimed, and of its even distribution over the arid States and Territories, and because it must be reclaimed almost entirely by means of irrigation, if reclaimed at all—all in view of the fact that it is now the property of the General Government. Public opinion can hardly realize that there is now, or was at the end of the fiscal year 1899, a little more than 567,000,000 acres of public land undisposed of by the Government; yet it is true, and 541,265,248 acres of this amount is situated in the arid States and Territories, and is distributed as follows:

	Acres.		Acres.
Arizona.....	54,608,531	New Mexico	54,720,863
California	50,132,241	Oregon	38,435,873
Colorado.....	41,988,377	North Dakota	19,500,555
Idaho.....	34,225,149	South Dakota	13,006,396
Kansas.....	734,080	Utah	35,231,466
Montana	74,558,143	Washington	19,028,420
Nebraska.....	10,799,332	Wyoming.....	52,055,248
Nevada.....	42,385,735		

This list shows something of an even distribution of these lands over the arid States and Territories, and in view of this fact it becomes important to know something of how much of it is subject to reclamation, and how. As to this, the most authentic means at our command is the report of the special Senate committee of the United States Senate on the reclamation of arid lands and irrigation, made to the Senate in 1890. In that they reported that there was from 100,000,000 to 150,000,000 acres of this land that could be made productive, and that only by means of irrigation—more than five times the quantity of reclaimed land in British India, from which 110,000,000 people are maintained. Some maintain that these lands should be ceded to the States and Territories. All history shows that this would be a failure. Especially is it so here.

By the acts of Congress, March 2, 1849, to the act of March 12, 1860, nearly 60,000,000 acres of land of the General Government, lying in

15 States of the Union, known as swamp lands, were ceded to the various States in which they lay. They are as follows:

	Acres.		Acres.
Alabama	414,310	Michigan	5,729,843
Arkansas	7,668,987	Minnesota	3,109,142
California	1,773,857	Mississippi	3,325,437
Florida	16,631,302	Missouri	4,495,816
Illinois	1,493,718	Ohio	25,660
Indiana	1,265,107	Oregon	315,164
Iowa	933,949	Wisconsin	3,349,132
Louisiana	8,968,880		

These are the beneficiary States of the swamp-land grants; and they are all, with a single exception, better able, so far as monetary expenditure may be concerned, to reclaim these lands granted to them by means of the levee system (and which is but the counterpart of the reservoir and canal system necessary to reclaim the arid lands, and far less expensive) than any of the arid States and Territories are to reclaim the arid lands in their boundaries. This will not be denied by those who oppose this theory I apprehend, because through the whole space of nearly fifty years not a single one of these States has ever made a single record of success by the reclamation of any of these lands that had to be reclaimed. They mostly went into the hands of alien speculators and land sharks for naught. On the other hand, the history of other countries that have taken the matter of reclaiming their arid lands in hand as a national enterprise for their people have made a prime success of it in every instance.

From time immemorial Egypt has maintained her entire population on lands that Egypt reclaimed as a national enterprise, and by it, in ages past, gained the name and title "The granary of the world."

This is no failure, and is an argument in our favor. Not only so, but in British India, where famine and starvation in former days prevailed because of the shortage in the production of the soil, since the reclamation of about 25,000,000 of acres of land by the Government as a national project famine has been prevented, death from starvation has ceased, and 110,000,000 of its people are maintained from the production of the reclaimed land by the hand of the Government. This is the success recorded in history for that enterprise.

The Governments of France, Spain, Algeria, Australia, Argentina, and Peru all bear the same testimony without a break on the same point. Therefore we see that in every instance when the work was taken in hand as a national enterprise it was a success, while on the other hand, when turned into the charge of the State, in every single instance it has proved a failure, and hence we fear the dangerous course wherein this all-important matter of reclaiming the public domain has so often heretofore fallen and foundered, and cling to that which has so often carried its followers into the haven of success.

Another reason is that, in the event of the States and Territories being financially able to reclaim the lands, insuperable physical barriers would be so prominently in the way that it could not be made practically effectual there.

This would be due to the fact that all of the streams of any great magnitude in the West, and upon which the greatest irrigation schemes would necessarily depend for the reclamation of the greatest bodies of these arid lands, have their source in Wyoming, Colorado, and New Mexico. If these States should have the sovereign control of these lands in their boundaries they would necessarily have the water as well, and would, as a matter of sovereign right, have the control of it, and

would therefore be able to defy the law of prior appropriations as applied between individuals, and by diverting the head waters of those streams would have those States and Territories lying below them at their mercy. At least it would be so in a measure. To state these physical advantages in favor of those three sovereign communities is to argue the case on this point, in so far as I now have the time to advert to it on that point.

Again, to ask this reclamation to be made by the General Government for the people of the West would be asking only fair and impartial treatment as between them and the people of the South and East and North. It would be asking no more for the benefit of agriculture in the West than the Government has done for the benefit of inland commerce in those sections just named.

For the benefit of inland commerce in those sections the Government has appropriated from time to time as original expenditure, to say nothing of the cost of keeping up the various canals, etc., in which it had an interest, no less than \$230,850,567.60, and, as before stated, none will deny that this was wisely expended.

These expenditures have been somewhat of a local nature too, rather than national, or for the national benefit. They were as follows—that is, there has been expended for inland commerce in the boundaries of the following States the following:

Alabama.....	\$2,764,191.19	Mississippi.....	\$2,323,856.10
Arkansas.....	784,910.28	New Hampshire.....	434,930.36
California.....	4,181,251.78	New Jersey.....	2,068,087.26
Connecticut.....	2,696,545.19	New York.....	17,495,321.60
Delaware.....	3,223,118.44	North Carolina.....	4,046,935.07
District of Columbia.....	210,000.00	Ohio.....	5,741,812.37
Florida.....	2,511,509.05	Oregon.....	5,264,863.66
Georgia.....	3,382,538.91	Pennsylvania.....	2,451,292.25
Idaho.....	15,000.00	Rhode Island.....	1,538,214.00
Illinois.....	4,948,784.11	South Carolina.....	2,912,679.90
Indiana.....	1,869,753.03	Tennessee.....	670,089.85
Iowa.....	319,563.37	Texas.....	6,652,697.16
Kansas.....	7,561.73	Vermont.....	767,946.84
Kentucky.....	1,705,531.99	Virginia.....	3,837,643.23
Louisiana.....	9,609,451.85	Washington.....	534,232.28
Maine.....	2,483,686.66	Wisconsin.....	7,705,301.32
Maryland.....	3,790,876.83	Miscellaneous expendi-	
Massachusetts.....	4,943,767.10	ture.....	188,405,189.96
Michigan.....	3,805,167.81		
Minnesota.....	1,771,810.46	Total.....	230,850,567.60

Not only so, but in at least twenty States in the Union the Government has exercised the functions of a canal builder, not unwisely either, as before stated, and not in a single instance has it been done in any part of the vast arid West; and it has also all been done in the direct interest of commerce and not of agriculture. As evidence of this we submit the following statistics bearing on this subject:

In the last fifty-three years Congress has expended in cleaning and improving harbors, building dams, canals, and the like work generally \$392,606,596.28.

In 1896 alone for the same purpose \$71,158,956.88 was expended.

This was all for the benefit of commerce in the East.

For canals and dams alone, for the benefit of commerce mainly, if not alone, the Government has made the following appropriations in the following-named States:

Alabama.—Grant of 5 per cent net proceeds of public lands after 1819; sale of same for canal on Tennessee River, \$10,000.

Florida.—For the Peninsula Canal, \$50,000.

Illinois.—Lake Michigan and Mississippi River Canal, \$200,000; Hennepin Canal, \$50,000.

Indiana.—Wabash River Dam and Canal, \$65,000; Lake Erie and Wabash River Canal, \$15,000; Ohio r. land grant of 2½ sections on each side of all canals.

Iowa.—Canal from Red River to Mississippi, \$1,500; Des Moines Rapids Canal, \$733,750; Sault Ste. Marie Canal, \$65,000.

Kentucky.—Louisville and Portland Canal, purchase of 1,000 shares of stock of the private corporation organized to build it. Value, \$100,000. Subsequent purchase and maintenance of the same, \$825,000.

Ohio.—Ohio River Falls Canal, \$90,000; Cumberland River Canal, \$10,000; Rough River Canal, \$25,000; Zanesville and Taylorville Canal, \$102,000.

Louisiana.—New Orleans Outlet Canal and Clarenton Canal, \$150,000.

Mississippi.—Carondelet Canal, \$25,000; canal from Mississippi to Gulf of Mexico, \$75,000; also 6 per cent net proceeds of all public-land sales for canal purposes.

Michigan.—Grant of 300,000 acres of land to build canal between Lake Superior and Lac La Belle; St. Clair Canal, \$1,095,250; Secretary of War authorized to draw for annual expenses for maintaining the canal; St. Mary's Canal, \$850,000; Secretary of War authorized to draw for annual expenses in maintaining the canal.

New Jersey.—Ship canal across Bergen Neck, \$150,000.

Oregon.—Cascade Canal, \$1,728,000.

Pennsylvania.—Surveys for ship canal from Allegheny to the sea, \$200,000; purchase of Monongahela Canal and improvements of the same, \$358,733.

South Carolina.—Purchase of 800 shares of Dismal Swamp Canal Company's stock; Santee Canal, \$39,000.

Tennessee.—Tennessee River Canal, \$250,000.

Texas.—Galveston and Brazos River Canal, \$25,000.

Virginia.—Purchase of 750 shares of Chesapeake Canal Stock Company's stock; purchase of 10,000 shares of Chesapeake and Ohio Company's stock; Chesapeake and Delaware Canal, \$20,000; survey canal Chesapeake Bay to Charleston, \$10,000.

Washington.—Survey canal Lake Union to Puget Sound, \$10,000.

Survey canal Bakers Bay and Shoalwater Bay, \$10,500.

Wisconsin.—Fox River and Wisconsin River Canal, 1½ sections of land on each side of Fox River, \$25,000; Milwaukee and Rock River Canal, 5 per cent of net proceeds of public land sales, \$146,000; Wisconsin River Canal, \$10,000; Green Bay and Lake Michigan Canal, grant of 200,000 acres. Purchase of portage of Lake Michigan and Lake Superior Canal, \$350,000; improving same, \$20,000.

To this much we refer to show what the Government has done for the benefit of inland commerce in the sections of country before named, and that the Government has wisely done it as a national work we are here to assert. But while we do, we further assert that, as a work of the General Government, between the construction of a reservoir for the encouragement of inland commerce and the construction of one for agriculture, there is practically no difference; and if there is, then the argument is in favor of the latter.

To ask for this reclamation of the arid lands of the West by the General Government for the benefit of agriculture in this great Western country is only to ask that fair play and even-handed justice be done between the different sections of this great country. It is but an appeal to the magnanimity of the General Government.

From May, 1875, to June 30, 1896, the Government received from the sale of public lands, chiefly from the West, \$336,532,129.20, which was expended in Eastern improvements. Scarcely a dollar was ever returned for any Eastern improvement or benefit.

This great Government can not afford to stain its name with partiality so great as to refuse to add its aid to that vast section in the West for the benefit of agriculture when it has done so much for commercial classes and commercial sections in other parts of the country. Indeed, my people do not expect it. They believe that this great country, whose bosom but a short time ago was trodden by the hoof of war, that passed from under it and through the greatest war ever known to civilization, and did it successfully, and did it without

the confiscation of a single estate or the execution of a single political offender, can never be so unfair.

Mr. BARHAM. Mr. Chairman, Mr. Mondell would like to have a few moments to continue his remarks.

STATEMENT OF HON. FRANK W. MONDELL, OF WYOMING.

Mr. CHAIRMAN: The committee very kindly gave me some time the other day, and before I had concluded the hour of 12 had arrived, and it was suggested that I should conclude to-day. I will take but a short time, as Mr. Mead, the irrigation expert from the Department of Agriculture, is here, and I know you will be glad to hear from him, he having been invited by Mr. Wilson and the committee.

I hope I made my position on some phases of the questions of national aid to irrigation development clear the other day, and I shall not go into that matter to-day except to reiterate briefly that it seems to me that the work which the National Government should undertake in the interest of irrigation is the work suggested by the resolutions of the Irrigation Congress last year. That is the work of conservation—of making the waters of the arid regions available for irrigation and does not contemplate the Government's actually reclaiming lands. The distribution of water in irrigation is a local enterprise and may be left to individual enterprise to carry out. On the other hand, the work of making available the waters which the Almighty has provided in the arid regions which are now available only to the extent of a very small proportion of their entire volume, owing to the fact that they rush down in flood periods and not uniformly during the irrigation season, is a public work.

I believe we are more likely to get Government aid by confining our efforts, as suggested by the National Irrigation Congress, to appropriations for conservation projects—conservation projects in the nature of storage reservoirs at the head waters of streams to store flood waters, to be turned loose in the latter portion of the irrigation season to make up for the deficiency in flow, and conservation projects where the proposition is to take waters of a great stream in the watershed of which there is no irrigable land and divert it to the watershed of another stream where there is irrigable land. Also those projects where streams, lying in deep canyons, would require diverting canals of great length and at great cost to bring the water to the surface, to place it in the same position that nature placed the water of those streams that flow near the surface. In brief, the work which the Government should undertake is that of making available all of the water in the arid regions for irrigation purposes.

Mr. REEDER. When the Government has made this available by your plan, does your bill propose a plan as to who shall then determine how the water shall be devoted?

Mr. MONDELL. I will say to the gentleman that every State in the arid region has a code of laws and customs relative to the diversion and use of waters, and under these laws and customs all waters used in irrigation in the arid region must be diverted and applied. The National Government can not attempt to interfere with these laws and customs without endless confusion. I think the Government aid should begin with the work of a purely national character, and end where you have placed the waters where private enterprise can divert and distribute them; and my idea is that in doing this the Govern-

ment should expect no direct return. If you had a specific project before you, where it seemed that there was an opportunity to secure a return, I do not know that there would be any objection to an attempt to do that, but I have some doubts of the feasibility of the Government's securing a full reimbursement, except it shall collect the same through the medium of the States by a charge for the use of the waters made available in addition of course to whatever nominal charge the Government might make for public lands under its project. It narrows the scope of Government aid and the possibility of Government expenditure tremendously to say that it shall begin and end with storage and large stream diversion. Instead, then, of it being a question whether the Government shall actually aid in the irrigation of perhaps 75,000,000 acres at a considerable cost per acre, the problem is simply one of making available for use in irrigation the waters of the arid regions. This is the work which private enterprise can not undertake and which the States can not so well undertake as the National Government, because in nearly all of these enterprises there are interstate questions.

The bill (H. R. 13993) which I introduced on this subject, after dedicating the proceeds from the sales of public lands to the aid of irrigation, provided for a full and comprehensive report from the Geological Survey, to be made to Congress next winter, as to the general subject, and report of the detailed survey and examination of at least one project for the conservation or development of water in each arid and semiarid State, to be presented to the Congress as a basis of legislation as the reports of the Chief of Engineers are presented to Congress for the use of the River and Harbor Committee at the beginning of each Congress.

I think that the suggestion of Mr. Newlands that the public-lands fund shall in the future be dedicated to the cause of irrigation a wise one. He dedicates it in his bill to the irrigation of arid lands; I dedicate it in mine to works for making the waters of the arid region available for irrigation.

Mr. WILSON, of Idaho. It has been dedicated two or three times before, and any part that still remains, I am afraid, is so limited that little can be accomplished.

The CHAIRMAN. There is this to be said in favor of this idea, as it impresses me: Supposing it were possible—which of course it is not—that this entire 75,000,000 acres of redeemable land could be redeemed at once; of course one result would be that, instead of the agricultural lands of the United States being lifted in value, that they would, as a matter of fact, be decreased in value. These lands are to be reclaimed as the country needs them. The proposed bill introduces a system of putting the public-lands fund to this purpose; you go faster as you need it, and you will slack up as you need it. It is going to be difficult to get the farmers in my section of Oregon to approve of any scheme that will put down the value of lands; but this is a safety valve, and as you need it the fund will expand, and then as you do not need them it will contract. I am much pleased with the suggestion.

Mr. NEWLANDS. You could provide that a certain price per acre should be demanded. I wish to say another thing with reference to the charges against this fund. It is true, as I understand it, that when agricultural colleges were started in this country that the appropriations were made for them out of the public-lands fund, and that fund was charged with that obligation; but it has long since been

relieved of it. The appropriations now made for the agricultural colleges are a part of the agricultural bill of the House.

Mr. MONDELL. The bill referred to would utilize the fund, whatever sum there might be in it, and provides for surveys and a report to Congress next January, in order that the Congress may have before it a general statement of the entire matter and at least one conservation project in each State and Territory in the arid and semiarid region.

The CHAIRMAN. Let me see if I can understand your idea. You propose to build dams merely by the Government, and there is to be no charge upon any lands for that. How do you propose to distribute the water—merely to pass it down the streams in some regular way by the Government, or do you propose to have ditches and draw it direct from the dam; and if so, if it is to be drawn from the dams, in what way is it to be done?

Mr. MONDELL. My idea is that conservation works should be undertaken as public works on internal improvement, and when the water is conserved it should be turned loose at the proper time to supplement the waning flow of the streams.

The question of the distribution of the water, taking it out of the streams, and the use of it, are to be left entirely as they are now, to State laws and State customs. The States have an elaborate system of laws and customs and regulations on this subject which are being perfected every year, and the States are well qualified, in my opinion, to handle the question of the distribution of the water.

I referred the other day to the Carey Act, which I consider a valuable auxiliary to this movement. Under that act projects of diversion and distribution too large to be undertaken by individuals holding lands under the desert-land law, can be successfully carried out under contract with the State, to reclaim large areas which are wholly public lands where the initial cost of diversion is so great that an individual or small neighborhood of people could not divert it themselves. Beginning at the genesis of irrigation, then, the ordinary diversion and distribution is accomplished by the individual, the association of farmers and others; the larger diversions and distributions, where the problem is one of irrigation only of public lands, can be undertaken under the Carey Act; and then you come to the problems of conservation and the diversion of great streams to foreign watersheds or from deep canyons, and these are, in my opinion, works which must be accomplished through public agencies, preferably the nation, because in nearly all of these propositions there are interstate questions involved.

The State of Nevada could not well go into California and impound the waters of Lake Tahoe, and it is necessary to impound those waters to make available a great river in that State, and so that is properly a National and not a State work. Even if it were practicable to construct and manage large storage systems by private enterprise, they should not be so managed because a system of storage reservoirs at the head of a stream is such an important factor in the flow of the stream during the entire season, and so intimately affects all users of water along the stream, that they should be at all times under public control and never under private control. We can defend our advocacy of national aid in this class of work because it is national; it is public in its character and it does not directly reclaim any man's land. It can not be said that it is an expenditure of the proceeds of the sale of public lands to irrigate Jones's land, or Smith's land, or Brown's land, because it does not make it any cheaper

for Smith, or Jones, or Brown to irrigate their lands than it would have been for them if nature, instead of sending those waters down in tremendous volumes in the early spring and then reducing the flow later, sent the streams down in a steady and continuous flow.

The Government would simply undertake the work of rectifying nature's work, as we rectify nature's work when we remove sand bars from the mouths of rivers and harbors, when we take shoals out of interstate streams. We do not in river and harbor work build the wharves on the banks or provide the anchorages, but we rectify the work of nature by making the waterways available for commerce; and we now ask the Government to rectify the work of nature in the arid regions to the extent of making available for use in irrigation the waters which are now valueless by reason of their uneven and uncertain flow. I believe that individuals and associations under the State can then attend to the work of distribution of water over the lands, and if the Government works stop at conservation, then there is no possible conflict between the State and the National Government.

Mr. BARHAM. As I understand your proposition, you take a stream, for instance, that you could not irrigate unless you conserved or reservoided the waters up in the mountains. Take Clear Lake. That is partly in my district. Now, if you only conserve the waters to come down Cache Creek, it would be of little or no benefit at all; but you have got to conserve the waters or reservoir them in such a manner as to carry them out at an elevation above where you could carry them out on the stream now and reservoir the waters at a point in the mountains, in the canyon. Your proposition is simply to build a dam at a point on Cache Creek, say, or at the mouth of Clear Lake, and back up the water, catch the waters, and then let the State attend to the balance of it, about digging the canals and carrying it through the valley?

Here comes the Cache Creek through a deep canyon, and reaches the valley. Now, where we use that water at all, it is way down where the river can be diverted or is diverted. If you hold more water up here and catch it in the lake, you want to start that canal or river 100 miles above where you use the river. In that case you would let the State or corporation attend to it?

Mr. MONDELL. I shall try to confine Government aid to such works as are necessary to make the water available for irrigation.

Mr. NEWLANDS. But your idea also, I think, as I have heard you state it, covers, if necessary, carrying the water from the storage reservoirs over intervening mountains, and so forth, to the point where private enterprise can take hold of it?

Mr. MONDELL. Yes, if that were necessary to make the stored water available; but I have not in mind any case where you would take stored waters across a divide.

Mr. NEWLANDS. I know of such a case.

Mr. BARHAM. That very case that I illustrated; I know of a dozen of them.

Mr. MONDELL. That would then be part of the work necessary to make water available for distribution under State laws by private enterprise.

Mr. NEWLANDS. Your plan then would include the canal that is necessary to carry it to the point where private enterprise would take it?

Mr. MONDELL. My plan includes anything necessary to make water available, and nothing for the actual distribution of water over lands.

There is a variety of projects that could be taken up besides storage reservoirs; the simplest are diversions of great rivers like the Colorado or the Green, where there is a surplus of water above the needs of its own watershed, carrying it into another drainage where there is little water but plenty of irrigable land. Such a diversion by the Government does not of course irrigate the land; it simply makes it possible for private enterprise to undertake the work of applying the water to the land.

STATEMENT OF HON. F. G. NEWLANDS, OF NEVADA.

Mr. NEWLANDS. Mr. Elwood Mead is here as an expert in these matters. Before he speaks I would like to state briefly my two bills, so that Mr. Mead can address himself to them.

We all agree in the West that irrigation is a public use, just as navigation is; that the maintaining and sustaining an equal flow in the river is just as much of a public work as river and harbor improvements for the promotion of navigation or commerce. We would all be very glad to see the Government undertake that work of the storage of water in our rivers and the maintenance of an equal and sustained flow without hope of compensation, and I have shaped a bill in reference to that; and I have also shaped a bill which sets aside the receipts from the public lands as a fund for the reclamation of the public lands of the West, which offers an automatic plan by which the West will reclaim itself through the agency of the General Government.

Now, as to the first bill (H. R. 14072). I introduced that bill yesterday. It takes six projects which the Geological Survey has examined. That is the first one I would advocate. It pertains to the projects which the Geological Survey has examined and upon which it has made detailed reports, showing the reservoirs to be constructed, the cost of construction, and, incidentally, the area to be benefited by the improvement. One of these is in Arizona—the San Carlos—at a total cost of \$1,000,000. Four in California—one, the construction of the Hetch Hetchy reservoir, which will cost \$507,000; another, the Clark Valley reservoir, which will cost \$2,000,000; and another work in Clark Valley, which is auxiliary to the other, which will cost \$2,100,000; Stony Creek reservoir, \$287,000; the Clear Lake reservoir, \$452,000. Then comes Montana, with the diversion of the St. Mary River into Milk River, costing, for the first 9 miles out of 16 miles, \$325,000. Then three Nevada enterprises—one, the Rock Creek reservoir, tributary to the Humboldt, \$62,300; another, the Lower Humboldt reservoir, \$148,300; another, the Truckee River, costing \$389,000. Then comes Wyoming, with the Grey Bull reservoir, \$49,962. Making in all \$6,327,000, with the total capacity, in acre-feet, of 1,415,000. That is to say, the water stored in all these reservoirs will cover 1,415,000 acres with water 1 foot deep, and, assuming that that water is directly applied to land and that it requires 2 feet to the acre, it would irrigate about 700,000 acres; and the total cost per acre-foot is \$4.47. That applies simply to the storage and the canals that are necessary to make the storage of waters available, and not to the diverting ditches and subditches that are necessary to irrigate the land.

Mr. BARHAM. Upon all those projects we have detailed and specific reports and estimates?

Mr. NEWLANDS. You have; by the Geological Survey.

Mr. WILSON, of Idaho. Do you not think it would be wiser to divide this up among the different States, following, by analogy, the course of the river and harbor bill?

Mr. NEWLANDS. I have patterned the bill upon the river and harbor bill, which takes first the projects upon which plans and estimates have been perfected. It considers, first, the Territory of Arizona, and appropriates \$150,000 toward the construction of the San Carlos dam. That, of course, will be followed up by later appropriations. Then in California it divides among three reservoirs there \$150,000—\$50,000 each. It gives \$150,000 toward the project proposed in Montana. It gives Nevada for its three or four enterprises \$150,000 in all, applying \$30,000 to the Rock Creek reservoir, \$40,000 to the Humboldt River reservoir, and \$80,000 to the Truckee River reservoirs. And in Wyoming it gives the entire amount asked for—\$40,000. In all the other States and Territories named here \$150,000 each. Then it takes up the question of the surveys in each State and Territory in the arid and semiarid region—Arizona, California, Colorado—and, acting upon the suggestion of the Geological Survey, it specifies the particular projects for which plans, surveys, and estimates are required, and makes an appropriation for each one of these States and Territories, aggregating from \$10,000 to \$25,000 in each, according to the recommendation of the Geological Survey, and it also provides for the test wells in the artesian-well districts. Every one of these sixteen arid and semiarid States is covered by appropriations for surveys, and plans and estimates, aggregating about \$250,000; and the completed projects—that is, the projects completed so far as plans and estimates are concerned—carry a total appropriation of about \$650,000.

Now, I would be very glad to see that bill passed, but I do not believe in the present temper of Congress it will pass, and I think it will take years for us to educate public sentiment to a point where it will pass. If we wait long enough I have no doubt it will come, but in the meanwhile we have reached in such States as Nevada the absolute limit of development, unless the flow of these rivers is maintained. And so far as we are concerned, we would rather enter now upon a work of reclamation which involves a restoration to this fund of the cost of reclamation than await the possible advantages of a bill modeled after the river and harbor bill in four or five years.

Now comes the second bill (H. R. 14088), which was my first. I have only introduced this other bill (H. R. 14072) with reference to the river and harbor bill to meet the objections of Mr. Mondell, and, I believe, the partial objections of Mr. Mead. I should be very glad to see it pass; but I understand that Mr. Mondell comes in to-day; and I am very glad he accepts the idea of this reclamation fund; that all he claims is that the fund derived from the sales of public lands shall be applied, not to the reclamation of public lands, but simply to the conservation of the waters; and I will speak of that in a few moments.

This bill of mine (H. R. 14088) provides, first, that all moneys raised from the sale of public lands in sixteen States and Territories (naming them) shall be set aside for the creation of a special fund, to be called the "Arid-land reclamation fund," which is to be used for the construction of reservoirs and other hydraulic works for the storage and diversion of water for the irrigation and reclaiming of arid lands. In the first place, what will be the size of that fund? In 1893 the sales from public lands were only about \$900,000. They have increased

Now, as to the charges upon that fund. It is true that when these appropriations were made to agricultural colleges that they were made a charge upon the public-land fund, but long since that has been abandoned and these appropriations are part of the regular appropriation bill. I insist upon it that all the proceeds from the sales of public lands should go into this fund, and if there is any question about it that we should relieve the fund of that charge.

As to the method of making this fund useful in the storage of water and the reclamation of public lands, section 2 gives the Director of the Geological Survey the power to go along and make investigations and reports, estimates and plans, both with reference to the storage of water and the supply of water through artesian wells, and also the diversion of streams into valleys that are not subject to them.

The third provides for the reports; the fourth provides that upon the filing of the reports the Secretary of the Interior may withdraw from public entry the lands which are required for reservoir or hydraulic purpose, or otherwise they would be taken up by speculators, and it also provides that lands subject to speculative schemes shall be withdrawn, so thereafter they will be subject to the advantages of reclamation schemes, so they can not be taken in large areas, and thus defeat the purpose of this act, which is to make homes for people in areas not exceeding 80 acres.

The fourth section provides that upon the determination of the Secretary of the Interior that a project is practicable, that then he can let contracts, but the limit of his authority is the fund in the Treasury. He can not exceed that. It also provides that after the letting of a contract no entries shall be made for more than 80 acres; that the Secretary of the Interior may, in his discretion, further limit the number of acres in each entry. For instance, if there is a project presented as to the lands capable of this intense cultivation, to which the gentleman from Arizona has alluded, then the Secretary of the Interior may provide a smaller unit of entry, thus increasing the number of homes that can be created by a common project.

Now, I come to the vital position, and I have endeavored to modify that in order to meet the views of Mr. Mead, which he expressed with great force and clearness in the hearing before the Committee on Public Lands. Section 6 provides "that upon the completion of each storage or irrigation project the total cost thereof shall be ascertained and the Secretary of the Interior shall prescribe such rules and regulations as to the price of the lands entered or to be entered and the right to use the water provided by such work as shall restore to the arid-land reclamation fund the amount expended therefor, in ten annual installments, and shall also make good to such arid-land reclamation project the amount expended by such common project."

mation fund the expenses of administration connected with such work: *Provided further*, That the right to the use of the water shall be perpetually appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right." That, you see, does not compel the Secretary of the Interior anywhere to enter upon the work of reclamation of the lands themselves. Perhaps the bill is sufficiently broad to enable him to do it, but it does not compel him to do it. He can limit his work absolutely to the storage of water or to the construction of a canal that will carry the stored water, as Mr. Mondell suggests, to some point where private enterprise can take the matter up, and it provides an elastic method of compensation. The method can be either by increasing the price of the land or by a charge for the use of the water, and that charge can be, according to his judgment and discretion, by the acre-foot, as Mr. Mead suggests, or he can attach a water right to the land itself. The endeavor has been to make that so elastic that the Secretary of the Interior, with the aid of the Geological Survey and the experts of the Government—the Agricultural Department and the Interior Department—are in absolute harmony upon these questions: they are acting in absolute harmony to-day upon the forestry question, and doubtless are on the irrigation question—that the Secretary of the Interior, with reference to each project, can devise rules and regulations for that project that will work out the greatest good to the greatest number and at the same time retain this fund inviolate for the reclamation of other lands.

The bill provides:

That in case the water thus provided shall be more than sufficient for the reclamation of the public lands, or if land in private ownership has been found by the survey above authorized to be better suited for the utilization of the stored or divided waters, or if there is a sufficiency of both, then the right to use such water may be sold at rates and on terms to be fixed by the Secretary of the Interior, but no water right shall be sold to any landowner or occupant for an amount exceeding 80 acres.

The purpose there, as far as entry is concerned, is to permit the occupation of lands, and the purpose, so far as giving the right to use water is concerned, is to prevent the monopoly of lands. As it is in the West, through unwise land laws, we have great land monopolies, in some cases as many as several hundred thousand acres being under one ownership. I think Mr. Maxwell alluded to a case where you can travel on one man's land for 100 miles. So that the purpose is not to allow the man who wants to monopolize land to get the benefit of that, but make it to his interest to divide up his land into 80-acre tracts for these grantees and then obtain these rights. It works no injury to the landowner. He is not deprived of any vested right, but it will be to his interest to divide up his land and to sell it.

These are the provisions of the bill. I will be glad to answer questions regarding it at any other time, but as Mr. Mead's time is limited I will now yield to him.

STATEMENT OF ELWOOD MEAD, IRRIGATION EXPERT OF THE DEPARTMENT OF AGRICULTURE.

Mr. Chairman and gentlemen, the situation which irrigation has reached in the West seems to be something like this: That this matter was originally left to private enterprise, and the pioneers of irrigation selected the best localities, and in doing so were able to take

water direct from streams at very little more expense than is now required to take water from main canals, simply because of the favoring conditions. After the most favorable opportunities had been reached, then private enterprise attempted reclamation on a larger scale. But the experience of recent years has been that those large enterprises—the aggregation of capital, or by partnership or corporations—are unprofitable. So we have practically reached the end of unaided development. We have been helped, in a measure.

Mr. RAY. If that is true, that these private enterprises which have been at liberty to select the most favorable conditions have not been able to find it profitable, is not that proof conclusive that it would be unprofitable and unremunerative to the Government of the United States to enter into that work on that line, upon the sale of lands at increased prices for remuneration?

Mr. MEAD. Yes, sir; if you simply take the money received; but the Government is in a different position from private capital. Private capital derives no benefit whatever from the increase, and in productive and taxable wealth the Government derives a large benefit from the population of the country that is now arid and deserted.

Mr. WILSON, of Idaho. Another suggestion there. The Government would derive a substantial benefit, financially speaking, indirectly in the sale of its lands, while the private individual would receive nothing except for the use of the water. That is, if the Government, by conservation, paves the way for the sale of 75,000,000 acres of land that can be reclaimed, the Government would receive something from the sale of that 75,000,000 acres which it would not if they were left sterile and unoccupied, as the case would be if we do not reclaim. So the Government would get some direct compensation for the increased sale of land in addition to the indirect advantages resulting in the development of the country.

Mr. MEAD. The Government would receive certain benefits, as has been stated, from the sale of the lands from which private capital derives no benefit whatever. I do not want to discuss this as a money-making enterprise; I am not discussing it on that basis at all. We have substantially reached the condition I have stated, so far as development by private enterprise is concerned; yet we have a very large area of public lands yet unreclaimed and practically valueless in its present condition, and many of the largest rivers are going to waste substantially undiminished. That is a tax on transportation, it is a tax on commerce, it is a tax on the development of the East, which would be largely removed if you could people that country. Those are certain benefits that will be derived by settlement that are matters for the nation to consider.

Now, if it is simply a question of bringing public lands into the market, if we are to consider first of all the bringing of public lands into the market and the reclamation of public lands at the least cost, in my judgment the place to begin would be to take these large rivers that are now running to waste. The reason they have not been used is because the expense of constructing dams is so great that there is no hope of any return from the original outlay.

If you bring those rivers to the surface of the ground, as the small streams exist—the streams that were utilized by the original settler—then settlers will be willing to dig out canals on the same terms as were done, and will be able to do it; that is, if you build these diversion works without hope of return. You can bring more land into use by building dams in the Missouri and the Colorado, the Snake and

the Green rivers, more public lands, and more private lands, possibly new lands, than you can by any system of reservoirs, no matter what its cost.

Western development, unrestricted development, has brought about a condition of affairs that makes reservoirs of immense importance. That condition of affairs is, that the variations in the flow of Western streams do not accord with the needs of irrigation. Streams rise before irrigators need the water, and they escape before they can use it beneficially. In many places streams are torrential in character, so that storage is an indispensable requisite to the utilization of the stream. On these streams, where there are early floods, where the opportunities for diversion have been such as to permit the construction of private canals, more canals have been built than there is water to fill them at the time it is needed. There is more land under cultivation than can be profitably cultivated, which creates a condition of very serious distress in many localities, and a very serious waste in many others.

Let me illustrate that. The investigations made by the Department of Agriculture show that the demands of crops in June and July are practically uniform. On many streams there is not 5 per cent of the water in July that there is in June, so if you could only hold back the water that goes to waste one month and use it the next month you could double and treble and quadruple the acreage of land which it is impossible to successfully reclaim where you have to depend entirely on the natural flow. Let us take the case of the Rio Grande, which carries 6,000 cubic feet per second in May. The flow drops down to only 2,000 cubic feet per second in July. Now, the needs of July are just as great as the needs of May, or even greater. Take another case, where the May and June discharge is from 12,000 to 17,000 cubic feet per second, dropping down below 2,000 feet in July—only one-eighth as much water in the stream in July as there is in June.

Now, that condition of affairs has resulted in this: People seeing an immense volume of water running to waste in June, Eastern capital has been invested to make use of it, not realizing that it is not the flood discharge that measures the success of irrigation, but the low-water discharge, so that we have scores and hundreds of canals and thousands of farms where each year there is a shortage of water, a greater or less loss of crops, and a great waste and an injurious use of water because of it. Let me illustrate that by the condition of affairs in the Salt River Valley. In the Salt River Valley in Arizona it is known that practically all the canals will have a short water supply in August. The result is that they pour all the water they can get into the soil early in the season, so as to create, as far as possible, a sort of a local reservoir in their own land; but that is injurious to the land; it is a waste of the use of water if you are not in a position to use it to the best advantage. It does not produce the results, and then occasionally the shortage reaches a point where even that sort of treatment does not prevent a loss of crops.

Now, if you have to subject yourself to the same vicissitudes of drought in an irrigated region that you have to where you depend on the clouds, so that the man having the ditches is just as subject to a loss of crops as the man who depends on the skies, irrigation can not maintain itself in competition with agriculture that depends on the rain, where your moisture is supplied free of cost. The very foundation of success in irrigation is that you shall have an ample water

supply throughout the season. The great need of reservoirs to-day is to take these streams where private enterprise has already built diversion works and where settlers are struggling to maintain themselves, and put them in a position to be profitable and prosperous. That means you are not to build ditches on streams, you are to build reservoirs on streams where the ditches are already in existence, where a system is already in operation.

Mr. MONDELL. In most instances that would also result in a complete system of storage. Most any stream in the United States has enough water for new lands?

Mr. MEAD. Yes; let us take this case. Practically all the land that can be practically brought under cultivation to-day on the North Platte is the land that they can depend on getting water from the remaining portion here. It does not make any difference how much runs to waste; it is not safe to attempt cultivation, because your crops will be started in the spring to be dried up in the summer. Now, first supply the necessities of users and then the extent of further developments will depend simply on the amount of storage you can provide for the interests of additional users, permitting a very much larger increased use of the early floods.

Mr. WILSON, of Idaho. Would there ever be a possibility of ever storing a large per cent of that surplus water; could you give us some idea, for instance, on the North Platte there, how much of that surplus might be stored?

Mr. MEAD. Each stream will depend on the opportunities for storing. Those vary greatly. On some streams the opportunities will permit of a complete utilization of the entire flow. On other streams this will not be possible. There are streams where you could utilize the entire supply, and there are many other streams where the attempt to answer this question would be merely a case of lack of definite information as to the size of storage works.

Mr. WILSON. It is hardly likely the flood waters of the Platte would be stored?

Mr. MEAD. I think they could be; I think that is a stream that could. I think the Snake River could by impounding in Jackson Hole. That of itself now serves as a sort of a reservoir.

Mr. NEWLANDS. I wish to call your attention, Mr. Mead, to the fact that there is nothing to prevent the supply to existing ditches under this bill.

Mr. MEAD. I understand that; I am simply explaining the situation.

Mr. NEWLANDS. I would like to call your attention to one proposition. Assuming that you start with this reclamation fund, and the reclamation of the West depends on keeping that fund good and even increasing it, how would you, if you simply turned the water into the streams, obtain an increase of that fund?

Mr. MEAD. If you will permit me to complete the discussion I am making I will take that up later. The situation which confronts the Government in taking up this matter it seems to me is this: That you can not build dams in these great rivers and then let the people build the canals without any interference with local institutions. You would not expect to build a dam and get any revenue from it. These reservoirs will be located largely on streams where ditches are already in operation, where those ditches have certain rights under State laws, where there is a system of administration. In Colorado there are about 100 officers who raise and lower these head gates, so that the rights of the different proprietors of water under State laws are pro-

ected; in Wyoming about 40 or 50; in Nebraska the same number or a less number. Now, if the Government builds storage works, just as it would build dams, just as they build docks as a means of regulating the flow of the stream and permitting a larger use, and make no attempt to charge, there comes no interference or conflict between what the Government is doing and what the State has already done; but if the Government makes the attempt to collect revenue and derive a return from this water in order to market its goods and collect its rental, it must be in a position to protect that water when it is turned into the channels of the natural streams, and that means they must have some authority to raise and lower those head gates in those streams.

Mr. NEWLANDS. I will ask you where a private individual now stores water is there not a law in most of the States by which he can deliver that stored water at any point on the stream that he wishes?

Mr. MEAD. And compel the State officers to regulate the head gates in accordance with it?

Mr. NEWLANDS. I do not know about the latter, but is there not a law which gives the man a right to store water and the use of the river channel to carry it where he wishes? And if that were so, would not that law protect the United States, if it was the owner of the stored water, the same as it would protect an individual?

Mr. MEAD. There is only one law.

Mr. NEWLANDS. There is such a law in Nevada.

Mr. MEAD. But Nevada has no officials to regulate the head gates. There is only one State that has; that is Colorado.

To go back. I have no objection to the principle of rentals, no objection to that at all. I think it would be perfectly proper if a State, considering water public property in a stream, should charge for it. It is not the principle of rentals, but it is the question of working out a system by which the Government will collect its rentals without interference or disturbance of existing State rights that needs to be brought to your attention and needs to be carefully considered in any legislation on this matter. I am not saying that this can not be done, but I am saying, and I want every member of this committee to regard that as an essential and important feature of this legislation, that you do not want to enter on this legislation without giving that matter careful consideration and working out some adequate and definite plan.

Mr. MONDELL. That is, providing the committee proposes a charge?

Mr. MEAD. Yes.

Mr. NEWLANDS. Do you not think that things could be worked out by the Secretary of the Interior, with the assistance of the Geological Survey and the Agricultural Department, better than Congress itself by rules and regulations?

Mr. MEAD. I think it ought to be worked out before any legislation is enacted, before you determine which of these two policies you adopt.

Mr. KING. Yet the ideal condition would be, in your opinion, would it not, that if the Government itself invests here for the purpose of creating these reservoirs and conserving the water, that they should get rid of the reservoirs as soon as possible—turn them over to State control or to private individuals?

Mr. MEAD. Yes; I think so; if satisfied that the States had enacted laws that would satisfy the Government.

In this matter of rental I fully agree with the idea embodied in Mr.

Newlands's bill, that the revenues arising by the provisions of this bill should go for the betterment of these States; that the disadvantages under which those people live, the drawbacks that nature has imposed on that country in this deficiency of moisture, entitle them to that consideration. They are entitled to it because the conditions of many of those States make aid of that kind necessary.

The facts pointed out by the gentleman who spoke first, that Arizona has 54,000,000 acres of public lands and that these other States all have somewhere near like amounts, entitle those States to be benefited as far as possible by the transactions of the Government in public lands; because the State derives nothing whatever in the way of rentals and taxes from those public lands; they have to administer law and order, to maintain local self-government over empires in extent, the greater part of which belongs to the Government—a Government that at the present time stands in the way of an alien landlord, that makes no homes, and pays no taxes. That is a condition of affairs that makes me indorse thoroughly the idea that whatever revenues there are ought to go to the building of irrigation works for the development of that country and the transfer of them from public to private hands.

Regarding revenues anywhere, to depend on the operation of the homestead law we can not expect any continuous revenue running over a long period of years—that is, any adequate revenue for the work before us; but there are between 300,000,000 and 400,000,000 acres of grazing lands, lands that never will be susceptible of homestead entry, that can not be filed as homesteads now without a man perjures himself—because you can not make a homestead out of them; in many cases a horned toad can not live on them in their present condition, and it would take a township to support a settler and his family. I do not believe that land is going to be left forever in its present condition, that everybody can use as he pleases, because there will be certain things in the future that are going to make the range stockman and the settlers that use it now as a free common, demand some protection and some settled policy regarding its occupation. If we begin the construction of irrigation works, even the crippled population it has will make the competition for that land so fierce that it is going to be a question of self-preservation and the maintenance of local peace that there be some provision dealing with the grazing lands as well as the other lands. Whatever is done, whether those lands are disposed of, whether they are leased, or whatever is done, every cent that comes from those should go into the irrigation fund. When you deal with that question you have opened up a source of revenue many times greater than anything we will get from the occupation of the land through the present land laws. So I believe for the next ten or fifteen years, even if we abandon the question of direct compensation, we would have a revenue large enough to enable the Government to carry on this development in a substantial measure from the proceeds of lands alone.

(Thereupon, at 12 o'clock, the committee adjourned until 4 o'clock p. m.)

WASHINGTON, D. C., *February 7, 1901.*

The committee met at 4 o'clock p. m., Hon. Thomas H. Tongue in the chair.

The CHAIRMAN. Mr. Maxwell is here, and as Professor Mead has not come in we might listen to Mr. Maxwell.

STATEMENT OF GEORGE H. MAXWELL, CHAIRMAN OF EXECUTIVE COMMITTEE OF NATIONAL IRRIGATION ASSOCIATION.

MR. MAXWELL. I wish to speak of the Newlands bill, No. 14088. I think a good name for that bill would be to call it the "omnibus bill." As we came in, Mr. Chairman, you referred to this matter, and to the point that the Government had expended during a period of years a large amount of money for preliminary work along the lines of this irrigation matter, and it is undoubtedly true that after fifteen or twenty years of Government investigation we are no further along than we were at the beginning, so far as the actual reclamation of the land is concerned. An immense fund of valuable information has been developed, and the time is ripe for action. Under this bill to which I refer, the Government can begin action immediately, and I believe along lines which remove every reasonable objection which has ever been raised to the Government undertaking the great work of bringing about the reclamation of the arid domain.

The first point which it seems to me is important in favor of the Newlands bill is that under it everything can be done which is suggested to be done by each of the other bills now before this committee. For instance, Mr. Wilson has a bill for the construction of the San Carlos reservoir in Arizona. There is also an item of appropriation in the Indian bill of \$100,000 to make further soundings to the bed rock and to segregate the land. If that item passes, that part is provided for, but if not, a reservoir could be built under the Newlands bill without any further legislation. Mr. Mondell has introduced a measure which provides that the fund derived from the sale of public lands may be used for the survey and construction of irrigation works. As I understand, it is not contemplated in his idea, or bill, that any of the moneys expended should be returned, and his bill does not provide for any construction work, but merely for preliminary surveys. So that all that is provided for under Mr. Mondell's bill can be done under Mr. Newlands's bill, No. 14088.

MR. MONDELL. My bill provides for a specific report, and of course any question as to what should be done—as to whether the Government should receive a return for its expenditures—would be a question which would be raised when the specific propositions came up.

MR. MAXWELL. That would require further Congressional action under your bill. Everything that can be done, practically, under your bill can be done practically under Mr. Newlands's bill without further legislation. The bill to which especially my attention has been called is one of Judge Barham's, providing for the complete investigation and survey of the arid domain. That bill is a thoroughly well-considered bill to the point to which it goes, but it does not go to the point of allowing construction to begin. Under the Newlands bill the surveys provided for by Mr. Barham's bill can be made, and construction can be begun.

MR. BARHAM. Is there a project now so completely examined and surveyed and estimated that the Secretary of the Interior could let a contract under this bill?

MR. NEWLANDS. I understand that complete plans and surveys have been made by the Geological Survey, and those plans and surveys are now printed in the reports of the Geological Survey. I will ask Mr. Newell if that is not so.

MR. NEWELL. We have printed the plans and estimates for several

projects, two or three in Nevada and several in California; also the plans for the San Carlos dam, on Gila River, and those for the diversion of St. Mary River into the head of Milk River in Montana. These plans have been made for ascertaining the cost; for actual construction additional details should be worked out. For example, in connection with the San Carlos dam, on Gila River, we should uncover the foundations in order to make additional drawings and specifications. When we have investigated the conditions there and settled on the exact position, we will be ready to go further.

Mr. MONDELL. You want to investigate there as to the exact location of the dam?

Mr. NEWELL. Yes, sir; it is a question of a few feet up or down the river.

Mr. BARHAM. The plans and specifications are not complete?

Mr. NEWELL. The \$100,000 item which has just been passed for that purpose by the Senate in the Indian bill provides several things: To continue the investigation as to particular details, to acquire the dam site, and to ascertain what the benefits will be, as well as the cost, and to lay the scheme out in all its relations to development of that part of the country.

Mr. MAXWELL. What I intended to say was that under this bill which I have before me, Mr. Newlands's bill, a report would be required to the Secretary of the Interior, with a complete plan, estimate, and survey, upon which he would determine whether he would order construction. I suppose that in making reports of that kind, any surveys heretofore made by the departments could be utilized without the necessity of doing new work.

In the bill there is, first, the provision for setting aside the fund; second, the provision for preliminary surveys, plans, and estimates of cost; third, for the making of a report, through the Secretary of the Interior, showing all the details in reference to the proposition; fourth, the power vested in the Secretary of the Interior to order the construction of certain works upon certain conditions, one of which is that no contract shall be let until the necessary funds are available. Another is that where lands are to be irrigated under any one of these systems, such lands shall be withdrawn from all other entry except entry under the homestead act, the idea being that in the absence of such provision the speculators would immediately jump in and locate scrip or make some other sort of speculative entries, which is against the policy of this legislation, its object being really to create homes on the public domain, and to settle it. The act provides that where the construction is ordered the cost of the work shall return to the Treasury through the funds derived from the use of the water. This would make a charge upon the land.

The great advantage of this bill is that there is not a section in the West, from Arizona to Idaho, and California, and Nebraska, whose needs are not fully provided, with the single exception that where conditions exist under which it is not feasible for the Federal Government to build the canals and reservoirs and get its money back from the use of the water, under those conditions a further application must be made to Congress. There is absolutely nothing which you must do to accomplish a reclamation of the arid lands, which can and ought to be done by the Federal Government, that can not be done under this bill, with the exception of those projects in localities where the conditions are such that for some cause the Government can not build a reservoir and get its money back from the use of the

water. It is hardly a just illustration with reference to the bill to take that condition as the only condition for consideration.

There are a great multitude of places where the Federal Government can build reservoirs, and can build main-line canals, and can so connect the source and supply of the water with the lands on which it is to be used that there is no possibility of complication coming about. It permits the Geological Survey, which of all the departments of the Government is the proper department to make these investigations, to make them. If the Survey finds that the Government can build a reservoir and canal to the Government lands, and possibly also to intervening private lands, and that the enterprise is practicable, it can so report, and if there is such a place as that the Secretary of the Interior is authorized to go ahead. If the Geological Survey reports difficulties, by reason of complications in regard to water rights, laws, or anything else, so that in that particular location the Federal Government could not get its money back, then an additional application must be made to Congress.

Mr. BARHAM. I wish you would explain to me the meaning of the sixth section of this bill, which says that "upon the completion of each storage or irrigation project the cost thereof shall be ascertained, and the Secretary of the Interior shall prescribe such rules and regulations as to the prices of land 'entered or to be entered' and the right to the use of the water," and so forth. Now, that contemplates the use of the water only upon public lands, does it not?

Mr. MAXWELL. I think not. "And the right to use the water provided by such work"—I think that is intended to cover both private and public lands.

Mr. BARHAM. How could you read it without "entered or to be entered"—to leave those out—and put the construction you had upon it?

Mr. MAXWELL. If there is any ambiguity there it should be remedied, because there are places, and many of them, where there are intervening private lands, and the private lands and Government lands are together, like the squares on a checkerboard, and unless you can provide that the private land should have its share, and the Government should have its share of the water, you would get into difficulties about the distribution of the water.

Mr. NEWLANDS. Section 6 is intended to give to the Secretary of the Interior the power to make rules and regulations not only as to the prices of water but the prices of the land itself in case it should be regarded as advisable to put into the price of the land the cost of the enterprise, whatever it might be, so as to get the entire cost out by a reasonable price placed upon the land. The words "entered or to be entered" mean not only the entries to be made in the future as to the making of the contract, but the entries made from the filing of the report up to the beginning of the contract, for it is declared in the preceding section that all lands entered after the filing of the report are to be subject to the charges and rules made by this act.

Mr. BARHAM. Subject to the entry of the land. What was in my mind was railroad land. Of course, we must treat that subject.

Mr. NEWLANDS. This clause only applies to the price of the public land. It is provided that the price for water for use on the railroad lands and other lands in private ownership shall be sufficient to repay the cost of conservation.

Mr. MAXWELL. That is in clause 7. Between them it is provided that the right to use the water on the land is restricted to 80 acres—that is, no one landowner can have more than 80 acres. That is

intended to cover the conditions in Arizona to-day in the Salt River Valley, where settlers have gone in and taken up Government lands. Here will be a quarter section of Government land, and here is a quarter section which is settled, which has been taken up, the next is open. If it is possible for the Government to provide the water there and allow the settlers to have the water on their land as well as giving it to the Government land, it will not complicate matters at all. The advantage in this bill is shown in a place like the Salt River Valley in Arizona, taking the Tonto Basin as an example. I use these examples to show that I am not theorizing. Suppose the Government should build the Tonto Basin reservoir. It will hold 800,000 acre-feet of water and it will irrigate a very considerable area of Government land, and also provide just what the people cultivating the little farms around Phoenix need to save them from dying out as they are doing now. They require a little water late in the season. The Geological Survey could go into that community, devise a plan whereby this water could be taken out and utilized by the community, and which would increase the area of the Government land irrigable and would turn the money received back into the reclamation fund. You could say to those people, "Now, if you will make a proposition so that you can take this water from the Government as a cooperative scheme, or in any way that will avoid complication, we will build this reservoir."

There are hundreds of places in the West to-day where, if the Government would indicate its willingness to supply water to settlers—and to-day they have no possibility of getting water from private enterprise—they would make any desired conditions in the way of shaping their claims to water rights and methods of distribution so as to relieve the Federal Government of every possible complication. These difficulties suggested here are the results of the work of the student in the closet. You can go on the ground in every case and plan a way to avoid them.

MR. MONDELL. I would like to interrupt you there just a moment. I do not know that I am a student in a closet. My work has been in actual construction —

MR. MAXWELL. It has been in Wyoming, Mr. Mondell.

MR. MONDELL. I don't know—I have constructed irrigation canals personally in several States and Territories, and I do not think I have ever been a closet student of this subject. But referring to the matter you have just suggested there, if it is a fact that in the places you have just referred to there is no question about the return from the building of these reservoirs either to the Government or the individual building the reservoir, in a case of that kind there is nothing to prevent the individual from going ahead and building those reservoirs and getting a return from them.

MR. MAXWELL. They have been trying for ten years to get private capital to build those reservoirs, and they have hoped against hope, and made trial after trial, for such a long time that they have now just about given up.

MR. MONDELL. Then, if private enterprise, after carefully considering it, has given it up, that means that it is not feasible, and it can not be made to pay.

MR. MAXWELL. That is an important point and one which should be emphasized in this connection. Private capital can not conserve water so that it can be made to pay, and this is one of the strongest arguments why the Government must take up the matter. It is rec-

ognized by all that the water must be conserved; that the reservoirs must be built, and large streams diverted if we are to make available the fertile but arid lands. Private enterprise has already made the experiment and has demonstrated that it will not pay from a financial standpoint; that is, as regards immediate profits and interest on bonds and stock.

The investor or speculator looks at these matters solely from the standpoint of profit, and not from that of the greatest good to the greatest number. If, for example, under a given project water can be conserved to supply 500,000 acres with a net profit of 5 per cent on the original investment, or a similar system will reclaim only 300,000 acres, but yield a profit of 8 per cent on the investment, the capitalist will not hesitate to adopt the latter, although by so doing 200,000 acres of good land are left sterile and opportunities for home-making on this land are forever destroyed.

In the case of reclamation by the Government, however, the question of immediate profits and of a tempting interest return is not considered. The matter of time, also, is not one always pressing; and if it is necessary to wait ten or even twenty years before all of the reclaimed land is disposed of, there is not the ever-threatening bankruptcy, such as is involved in a speculative enterprise, where the lands or conserved waters are not disposed of at once.

When a corporation has undertaken such work, the funds raised for preliminary surveys and investigations are expected to be refunded, with interest, from a time antedating the survey. In this way the money invested for construction must ultimately pay interest from a period preceding the laying of a stone. If for any cause the work is delayed or the settlers become discouraged and do not take up the land rapidly, the interest charge, running day and night, increases the cost, and, as has been frequently the case, the bondholders must step in and take the enterprise, reorganizing upon a different basis. These reorganizations are again discouraging to the settler and involve additional expense, and so these enterprises, financially considered, have been failures, although of great benefit to the country when considered from other standpoints.

In the case of Government construction, the conditions are far more simple. They are along the line of reclaiming the largest possible area of arid land at a cost commensurate with the ultimate value of the reclaimed land, and with the probability of ultimate return of the cost without reference to interest on stock or bonds. If ten or even twenty years are required for the gradual settlement of the country and the disposal of the water, there is no anxiety nor loss, since experience demonstrates that the conserved water and the reclaimed land is slowly but steadily attaining a higher and higher value.

While the interest charges are not considered on the funds thus invested, yet the Government is by no means the loser, as the indirect gain through the increase of population and of taxable property far more than compensates for any interest charges.

If a corporation could be put in the position of the Government, as the owner of vast quantities of land, with vital interest in the welfare and prosperity of the people, there could be no hesitation in considering the reclamation of these lands as one of the best of business enterprises; but with the existing condition of things under a democratic government the corporation can receive, not the multitude of indirect benefits, but only a profit along one narrow line.

In the localities concerning which I have spoken they have been

trying for years to induce private capital to complete these reservoirs; but it is impossible to demonstrate how private capital can receive an adequate return for the risks involved. There is no class of property which is considered more uncertain than irrigation bonds and stock, owing to the gigantic frauds which have been perpetrated within recent years. Capital can not be induced to go into this work of conservation unless extraordinary profits can be shown, and these are not possible; even if they were, it would not be a matter of sound public policy to make of a public utility of this kind a speculation such as would load down settlers with inflated debts.

The CHAIRMAN. Mr. Maxwell, are you going to remain in the city for some time? I ask because we have Mr. Mead here now, and it was our intention to hear from him to-day.

Mr. MAXWELL. Certainly, if Mr. Mead is here I prefer to give way to him.

STATEMENT OF ELWOOD MEAD, IRRIGATION EXPERT OF THE DEPARTMENT OF AGRICULTURE.

Mr. MEAD. I have no desire to say anything more than I have already said to-day.

Mr. NEWLANDS. I suggest that it would be a more orderly proceeding to have Mr. Mead conclude his remarks, and then have Mr. Maxwell take up the subject again.

Mr. MEAD. I really have nothing further to say.

Mr. NEWLANDS. Have you looked over this bill since our adjournment?

Mr. KING. I would like to have Professor Mead discuss the best mode of reclaiming the arid land and at the least possible cost, and to have his opinion as to the most practicable and feasible scheme, and the one that will address itself to the judgment of Congress and be the best calculated to receive the support of the people who do not live in the West.

Mr. MEAD. I should hesitate to undertake that without preparing for it. It is a pretty big subject; I think it would take more time than I imagine the committee could devote to it this evening. I would be very glad to do that, but I should not want to undertake it and have to feel that I had dealt with it inadequately.

Mr. KING. I would like to ask you, do you think that a cession of all the arid lands in all of the States to the States would prove a solution of this question?

Mr. MONDELL. Why not the mineral lands also?

Mr. KING. Well, we have here only jurisdiction of the public lands, and to open that subject would provoke a storm of controversy that is not necessary to be raised yet.

Mr. MEAD. I would answer that in this way, that I believe a properly guarded cession, which would prevent an improper use of these lands, would serve the same purpose as national legislation. It would have to be properly guarded legislation; legislation that would provide for a cession in trust; and I would say further that no answer could be made that would not have to have some limitations.

Mr. NEWLANDS. What limitations?

Mr. MEAD. There are States in which a cession of the lands would answer every purpose. There are States in which irrigation is an important interest; there are States that have paid a great deal of attention to this matter and have laws for dealing with the matter.

A cession of lands to those States, I believe, would be the most effective and the simplest solution of the question. There are other States where the irrigation is not of first importance that have no adequate irrigation laws, and where this interest would not receive proper consideration. A cession to those States without some adequate safeguards would be improper.

Mr. REEDER. Do you think there are any of these States that would handle the lands better than the Interior Department or the Government?

Mr. MEAD. Yes, sir.

Mr. REEDER. You think there are States that would handle the land to better advantage?

Mr. MEAD. Yes, sir. Do not understand me to say that they would handle them more honestly.

Mr. REEDER. They handle them more efficiently on account of their machinery?

Mr. MEAD. They would handle them better.

Mr. NEWLANDS. Take several cases in Nevada and California. Take the Truckee Valley and the Carson, where the lands irrigated are in Nevada and the storage sites are in California. Do you think a cession of those lands to Nevada would enable the State of Nevada to conduct the necessary operations to reclaim those lands?

Mr. MEAD. Suppose the Government goes into California now and builds a reservoir, it will have to provide by legislation for the regulation of the stream between those two States, and there will have to be legislation of that kind anyway, and it will require some additional legislation.

Mr. NEWLANDS. There will be no regulation of the stream between those two States in the case of California and Nevada, because in California the streams are dashing streams—swift mountain streams, you know—and there is no purpose to be accomplished by the regulation of flow there.

Mr. MEAD. Yes, sir.

Mr. BARHAM. Do you not think that if Congress would pass a regulation for the reclaiming of lands in Nevada they could go into California and erect reservoirs?

The CHAIRMAN. Nevada could not do it; I am discussing now simply the ceding of lands to Nevada.

Mr. MEAD. The question asked me was with respect to the management of the lands.

Mr. NEWLANDS. Yes, sir.

Mr. MEAD. What I was referring to in the case of the lands was this, that there is one class of lands at the present time that is not being managed at all, and that is the grazing lands. There are several hundred millions of acres of lands that never can be and never will be cultivated. They are too rough and broken, and there is no water for them, and there is no management or any provision for management of them at the present time. I believe the States as a whole would deal with that question better than it is being dealt with now, but possibly some States would deal with it worse, because a bad management is worse than no management.

Mr. KING. There is no management at all now?

Mr. MEAD. No, sir. I think ultimately the Government will do something with all these lands. I do not think there is any prospect of the lands ever being turned over to the States if the Government goes into the work of reclamation. It will handle the lands.

Mr. BARHAM. What I wanted to get at by my question is this: We

have been trying to study this question for about six years here, and we were all originally of the opinion that the lands ought to go the States.

Mr. MEAD. Yes.

Mr. BARHAM. Now, you take Nevada for an illustration. How would it be possible for Nevada to conserve the waters of California under an act passed in Nevada; and yet is it not possible and legitimate for the Congress of the United States to do that very thing?

Mr. MEAD. I think it is.

Mr. BARHAM. How far would you go toward an irrigation of arid lands, that is, the conservation of the water, simply to conserve the waters in reservoirs?

Mr. MEAD. Do you mean by the Government?

Mr. BARHAM. Yes, sir.

Mr. MEAD. I believe it is proper for the Government to build dams in large rivers where the expense of diversion is at present prohibitive. I believe it is proper for the Government to build storage reservoirs at the head of streams to regulate the flood flow of those streams.

Mr. BARHAM. Would you go further and carry the water upon the lands and distribute it?

Mr. MEAD. No, sir.

Mr. BARHAM. You take it in my State. I do not ask this for the purpose of defeating legislation, but for the purpose of being able to answer questions. You take it in my State, where the waters are all appropriated over and over again, and there is an existing law, if they are not, whereby they could be appropriated over and over again. You take any scheme in California, and you reservoir a lot of water. That water of necessity would go into the hands of private corporations or individuals.

Mr. MEAD. It ought not to.

Mr. BARHAM. No, of course not.

The CHAIRMAN. It would simply run down the stream in its accustomed course, if it were turned into the stream.

Mr. BARHAM. No, sir. Here are many ditches in places which do not carry half the water that they would or could use in the months that need irrigation. These corporations or individuals can not give their customers half as much water as they want. Suppose you conserve all the waters properly open to conservation. The appropriations in California made, or to be made, would take all the waters which it was possible to catch in reservoirs, and how is it possible to avoid the fact that you are going to enrich these corporations that have the ditches there now?

Mr. MEAD. In the first place, I do not believe that the right to water should belong to a company or to a speculator, but these rights should attach to the lands which are irrigated.

Mr. BARHAM. But here it is the other way.

Mr. MEAD. Yes, but the question you have to consider is whether you will have California amend its laws or whether you will have the Government enact laws for California.

Mr. BARHAM. Of course, we could not ask California to amend her laws. These rights are all vested rights attached to the lands that have canals there.

Mr. KING. Does not your case suggest one of the almost insuperable objections to the Government attempting distribution, where not only the high water but the low water has been taken up?

Mr. BARHAM. I want to get at the facts, that is all.

Mr. MEAD. It seems to me that if the Federal Government should establish a storage reservoir in the case you suggest, the first thing would be to determine the maximum appropriation in high water, and then the Government could only get anything above that maximum. For instance, if in high water they have appropriated there 1,000 inches, the Government would have to keep on carrying down to them 1,000 inches, and it would have to conserve water above that 1,000 inches or else its work would benefit none but those who were already using that amount. And above that 1,000 inches the Government unquestionably, as an appropriator, could sell anything more than that which was available.

Mr. BARHAM. They could sell the water?

Mr. MEAD. Yes, sir.

Mr. BARHAM. How would you distribute the water?

Mr. REEDER. Could you not measure that water where it goes out of the reservoir, and is not there a system which permits that water to go out down that stream 5 or 10 miles, and the same amount to be taken out down there? Your weir tells you what amount you put in, and then you go down below and take out the same amount, less evaporation. But when you come to a place where you have appropriated more water than absolutely exists, that could not be done in such a place unless they could get some scheme that would solve this question. If you can say to them, "If you can arrange this so that you people can pay for it, we will do it, but if you can not make such arrangements we will go to Nevada or somewhere else and do work there."

The CHAIRMAN. It seems to me those places where they have appropriated the complete amount of water, where it is done by corporations, as I understand it is done in California, it strikes me that those are good places to let these corporations build their own storage reservoirs.

Mr. MAXWELL. This bill does not really have any application to the interior valleys of California. It does not apply there, but there are immense regions where it will be the salvation of the people.

Mr. BARHAM. Oh, well, I have projects in my own State, plenty of them. For instance, there is one for running a tunnel through to Willow Slough, I believe.

Mr. MAXWELL. That is a place where this bill would work to a charm.

Mr. MEAD. It does not make any difference what bill you pass, whenever it goes into operation you are going to run into that question of whether you are going to recognize the right of each State to distribute water in accordance with established laws and customs, or whether the Government is going to assume the responsibility on this whole question, if it does not recognize State rights.

Mr. KING. Pardon the interruption, but do you not think that we have got to recognize State rights, and the laws of the sovereign States, wherever we go upon a stream where appropriations have been made; and the only places where the Federal Government would assume supreme control would be where there are no appropriations?

Mr. MEAD. I see no objection to the alternative proposed a moment ago, that this Government should establish certain conditions upon which it would appropriate funds.

Mr. KING. I wish to be perfectly frank with you, and I wish to say that I should oppose any bill, I do not care how beneficial to my State or any other State, which seeks to abrogate the rights of the States to

control their own regulations and rights with relation to the distribution of water.

Mr. NEWLANDS. This bill especially preserves all those rights.

Mr. PHILLIPS. How far should the National Government go in the conservation of water in opposition to State laws, or where should they stop?

Mr. MEAD. I see no objection to the General Government passing an act to provide that all the water which is rendered available should attach to the land irrigated; that there should be no charge for the distribution except a carrier charge, and the right of appropriating those waters for speculative purposes should not be recognized; and I see no reason why every State should not enact a law of that kind. The Government required the States to provide certain guaranties in connection with the Carey Act. The States had to pass satisfactory laws, laws that were approved by the Secretary of the Interior, before they could undertake to handle that donation. The situation you [Mr. Barham] refer to in connection with certain of the proposed reservoirs in your State is familiar to me. I visited the stream you speak of several times, and there are three or four abandoned ditches, and the single ditch in operation was only diverting about one-quarter of the water of that stream, and the rest was all going to waste, simply because of litigation. Parties or corporations have been seeking to establish control for speculative purposes, and they have tied up the use of that stream almost entirely by litigation. The first step in irrigation development is to get just and effective State legislation. But the difficulties that the States have had in enacting proper and sufficient State laws show the impending difficulties that Congress would encounter if it undertook this work.

Mr. MONDELL. Do you not think there is a field in which the Government could operate in which it would not interfere at all with the State, or the State interfere with those operations.

Mr. MEAD. Certainly. I think some works are of such magnitude and cost and their benefits extend over such vast areas that the Government is the only agency now equipped to undertake them. All storage works on the heads of streams should remain public works. They should not be private works even if the private parties were willing to build them.

Mr. MONDELL. Suppose that Congress should decide to enter upon a system of construction of storage reservoirs, and of those only, and should also determine that it would not enter upon a scheme unless some way of receiving compensation for the project in, say, ten years, either by means of the land or of the water, could be arranged —

Mr. MEAD. Yes?

Mr. MONDELL (continuing). What plan would you suggest of compensation?

The CHAIRMAN. Perhaps Mr. Mead has not considered that question.

Mr. MONDELL. I think we want to have the professor outline his ideas of what national legislation ought to be passed and what the General Government ought to do in the way of legislation. Probably the professor has thought out something on that line, and I would be glad to have any suggestions in that direction. What would you think is the proper field for the General Government to work in—what it ought to do?

Mr. MEAD. Just as a prelude to that statement let me say, in connection with Mr. Newlands's question, that I do not believe the Government ought to undertake that sort of work with the idea of getting

a direct compensation until it had determined first whether it was willing to assume control of the streams and regulate the head gates of existing ditches and collect its revenues either from the water or the land. If it decides it does not want to do it, then it should wait until the State makes the laws that would insure the collection of these rents and their transfer to the Government.

Mr. BARHAM. We ought first to find out the facts in each particular project and then legislate for that particular project?

Mr. MEAD. Yes, sir.

Mr. BARHAM. That is my idea.

Mr. MEAD. Now, I think that the Government can appropriately begin with the construction of storage reservoirs, because they are needed on a great many streams to supply the deficiencies of those streams, and as a means of further extending the reclamation of the cultivated area or the reclamation of public lands by permitting a larger use of the flood waters that now run to waste early in the season. The storage works on the head waters of streams are works that in the first place should not be built as private works but as public works, for if they are built as private enterprises the owner of a reservoir has an opportunity in times of necessity to levy almost any exactions he chooses and which the necessities of the farmer will compel him to pay. Without the protection afforded by public control of streams the owner of a private reservoir who must turn his supply into the stream will often have difficulty in delivering water to the people who purchase it, so that with private ownership distribution must be protected at public cost, otherwise there is the danger that the reservoir owner would not make anything. These works ought to be public works, and they ought to be built as an aid to the improvement of the country.

This is a work that the Government can appropriately enter upon at this time, and if the Government builds them simply as a method of utilizing our wasted resources and promoting the public welfare it can appropriately charge nothing for the water, relying on getting its compensation in other directions. That does not interfere with development by private enterprise or with the operation of State laws. The Government can say that that water shall not belong to any speculative owner, but shall belong to the States, and can provide that the States shall be required to make laws for its distribution. Some of the States would not require any additional legislation, for they already have it. If the Government charges for it, it must then require that the States shall set in operation suitable machinery for collecting the charges for the water from those reservoirs, or it must go on the stream and collect them for itself. There are only the two alternatives. Take almost any instance I know of, and unless you have some machinery, some plan under which public officials having the law at their backs can raise or lower head gates, there will never be certainty or peace in the distribution of water stored with the public funds. This feature must be considered in any legislation that provides for a return of the money expended on reservoirs.

Mr. NEWLANDS. Under this bill the Secretary of the Interior could refuse to enter upon a project until some method of compensation was secured, or the State itself made laws insuring collection, could he not? He could do that as part of the rules and regulations?

Mr. MEAD. He could do this; and could he not, on the other hand, if he saw fit, build a reservoir in a State like Colorado, which has a State engineer and water commissioners, and then put his own agents on that stream and make regulations?

Mr. NEWLANDS. I should think not. This law recognizes the laws of the States in regard to the appropriation and diversion of water, and the United States, in its capacity as a water appropriator, would stand in the same place as any citizen. I should certainly expect the Government, however, before it entered upon a project—and I think a business man like the present Secretary of the Interior would certainly take care of that—I should certainly expect that before he entered upon the project at all he would have some method devised, either by State laws or by arrangements with the people who had already occupied the lands, and had ditches along the river, by which he would have compensation. That would be simply a business arrangement.

Mr. MEAD. Any legislation which stimulates the establishment of administrative laws by the States is worth far more than the land reclaimed by any storage or other work.

Mr. REEDER. We have either to take these appropriations as donations, or we have to take them with the hope of returning them to the Government. Now, I am very much in favor of the Government simply building the reservoirs, but I do not believe that we have got to the place where Congress will do that. But if Congress sees there are certain funds that come from those regions, and which are available for use in the work of irrigation, I think they will let us use them, with the provision for a return, and I prefer to do the thing in that way rather than not to do it at all.

Mr. NEWLANDS. The view of the average business man in the East in this matter is this: "You propose to reclaim 75,000,000 acres of land which is worthless now; will it be worth anything to you after the reservoirs are built and the rivers maintained at an average flow?" You answer, "Yes." "How much?" "From \$1 to \$10 without the irrigating ditches, even in its present desert state, with the chance of getting water out of a river when reservoired." They will say, "Well, if this work raises the land to that additional value, it suggests to us that there should be some method by which we will get the money back, and by which the same money can be used over and over again in making water available for the reclamation of other lands." Now, the purpose of this legislation is to make the water available for that purpose under such rules as the Secretary of the Interior may provide, and I assume that he will study carefully every project, and look particularly to the compensatory part of it, and see to it that either the local regulations and agreements or the existing laws of the States present a method of securing compensation.

Mr. BARHAM. I would like to ask one more question, and that is, if in your opinion the Gila River is in such a position now that it could be taken charge of by the Government of the United States under some such project as has been talked of here. Have you sufficient data so that the Government could go to work on that project and demonstrate to the country what can be done?

Mr. WILSON, of Arizona, has a bill pending here for that work.

Mr. MEAD. I have no personal acquaintance with the Gila River. Mr. Newell can answer that.

Mr. NEWELL. In my opinion the matter is in a condition which should be handled along the lines of the Indian bill, continuing the detailed surveys to ascertain all of the facts with the greatest care to ascertain the benefits to be derived and the cost of the work, and to actually begin work in the laying of the foundations as soon as the minor matter of shifting up or down the channel a few feet is determined.

Mr. BARHAM. Have you made these surveys and examinations sufficiently, so that you could at once proceed with a contract for putting in a portion of the foundation, at least?

Mr. NEWELL. In reply to that I would say that a provision was carefully drawn and inserted in the Indian bill covering all these features. Now, if Congress is willing, the work can be begun at once and pushed through to a successful completion as rapidly as the funds are forthcoming.

Mr. WILSON, of Arizona. Has the amount—that is, the cost of the structure—been determined?

Mr. NEWELL. Yes, sir.

Mr. WILSON, of Arizona. That can be made a complete work for the amount already figured out, as to the cost?

Mr. NEWELL. Yes, sir. The cost has been estimated upon that by two of the best known men in this country, Mr. J. B. Lippincott, of Los Angeles, and Mr. James D. Schuyler, who was engineer of the Sweetwater and the Hemet dams, so that there would be no hesitation about building these structures immediately. There are minor details which should be carefully considered after knowing the foundations.

Mr. BARHAM. Do you know of any reason why we should not pass the bill of Mr. Wilson?

Mr. NEWELL. No, sir.

Mr. KING. I would like to ask some questions of Mr. Newlands. I wish to preface the questions I ask Mr. Newlands by saying that it seems to me, in order to stand any show of getting legislation on the lines proposed in this bill, we have got to provide for compensation; and I do not see any reason why men who can go on the public domain and take up the land after the Government has gone to a big expense and brought the water right to their doors, ought not to be willing to pay for it. Homesteaders now have to pay \$45 and \$50 an acre for every acre of water they get. Now, if the Government pays a large proportion of this—of course it will not pay for all of it; private canals and lateral ditches will be dug by private enterprise—but if the Government pays a large proportion of the cost incident to the matter, I see no reason why they should not pay the Government for the value of the water obtained, and thereby increase this fund, which is constantly being diminished now, for the prosecution of further schemes.

I want to ask Mr. Newlands when, in his opinion, assuming that the Government enters upon this scheme of reclamation, can the Government safely withdraw from the State and leave to the State the operation of a reservoir constructed by the Government?

Mr. NEWLANDS. As soon as it receives compensation.

Mr. KING. Suppose a reservoir is constructed capable of irrigating 100,000 acres of land, and 50,000 acres of that water are sold, leaving 50,000 acres unsold. How would you unite the conflicting interests there for the purpose of governing and controlling the water, and how would you control the water? Would you have some representative of the Government there in the State taking charge of this reservoir, and trying to cooperate, as by a sort of an involuntary partnership, with the other persons to whom you had alienated it?

Mr. NEWLANDS. I should think that so far as existing occupants are concerned, having existing ditches and partial reclamation, but without a sufficiency of water, the Secretary of the Interior could make arrangements with that acreage to supply them with so much water, and fix it in the shape of water-rights appurtenant to the land irrigated. Now, we will assume that a man owning 80 acres of land

has sufficient flood waters to furnish him with a foot of water all over his land, and he needs 6 inches more during the period of drought. Rules and regulations should be provided for by the Secretary of the Interior so as to fix the price of that 6 inches, and he should make it payable in annual installments, ten annual installments, say, and he would very likely even go further and make it a lien upon the land. But I think all that would be a matter of rule and regulations. Now, suppose besides these settlements there are existing public lands that are incapable of reclamation under existing conditions. Their value would be very much greater by reason of the fact that the flow of the stream would be much greater and would be properly regulated. Now, the Secretary of the Interior could make a regulation that from \$1 to \$5 an acre should be paid in ten annual installments, say for the land itself, leaving it to a man to arrange for the carriage of it through existing ditches.

MR. KING. Does it not look to you like there would be an enforced partnership between the State and individuals and the Government which would establish more or less a system of paternalistic landlordism?

MR. NEWLANDS. No, sir. I think the title to both land and water would gradually drift out of the Government, and I think instead of perpetuating the ownership of land it would have a tendency in exactly the opposite direction, for the Government will be constantly parting with its rights, both in land and water, and in the end the control of the reservoirs and irrigation works can be finally turned over to the homesteaders. I have not provided for such turning over in this bill. Mr. Mead suggested that it would be best to turn over the reservoirs to the States. That is all very well if the reservoir is in the same State as the land to be irrigated and reclaimed. But suppose such a case as that in Nevada, where these three rivers, whose reservoirs will be in California, irrigate lands in Nevada. Nevada could not administer a reservoir in California. So I left that out completely, believing that the experience of operation under this act would make apparent some method by which that question could be properly handled.

MR. REEDER. Do you not think that the homesteader and the Government have already gone into a partnership, and that until the homesteader perfects his title that partnership does not cease to exist until the final papers are made out?

MR. KING. There is no partnership. The Government does not control his crops or his conduct. He is not renting anything. They are in the relation of vendor and vendee.

MR. NEWLANDS. Yes, and that would be the relation here.

MR. MEAD. I would like to add one more word. The discussion of Mr. King and Mr. Newlands has suggested to me a little further elaboration of my answer to this committee a moment ago about legislation. I believe that States which have good laws and proper institutions, if they had the lands they could handle this matter better than Congress can, looking simply at their internal interests and ignoring this question of interstate waters. I believe there are States where they are not equipped to do anything with this question, with either the land or water, under present laws, and there must be, inevitably, better State water laws in the future, or the interests of irrigation will be seriously jeopardized; and I believe that in those States one of two alternatives must be accepted—either Congress must insist on adequate legislation previous to appropriating money to help them, or

it must enact laws of its own and take control there, because there is absolutely no provision whatever in many of these Western States by which there could be any effective distribution of stored water. There is now no orderly or systematic distribution of the water of the streams, and one of two policies should be adopted by the Government in this matter—either to put pressure on the States to enact wise laws, and then distribute the water under those laws, or else Congress to take control itself.

Mr. NEWLANDS. Would you suggest that a provision be put in this bill similar to the provision in the Carey Act, compelling the States to pass legislation upon this subject that will be satisfactory to the Secretary of the Interior?

Mr. MEAD. I believe that would be a wise provision, and a helpful provision to the whole Western country. It would stimulate interest and action in this matter. There are a number of provisions in Mr. Newland's bill that ought to be incorporated in State laws. They are entirely right. The provision for small acreage and the provision for prevention of speculative ownership of water are wise and proper, and I see no reason why there should not be properly inserted in this legislation that the States should enact provisions for the orderly distribution of the waters of the streams and for the collection of the money under State laws, and guaranteeing its payment to the Secretary of the Interior as a condition precedent to receiving aid. That has been done in legislation making donations to States before.

Thereupon, at 5 o'clock p. m., the committee adjourned until Saturday, February 9, 1901, at 11 o'clock a. m.

WASHINGTON, D. C., *February 9, 1901.*

The committee met, Hon. Thomas H. Tongue in the chair.

The CHAIRMAN. We would like to hear from Mr. Maxwell in continuation of the discussion of the practicability of the Government constructing works for the reclamation of the arid lands.

STATEMENT OF GEORGE H. MAXWELL, CHAIRMAN OF EXECUTIVE COMMITTEE OF NATIONAL IRRIGATION ASSOCIATION.

Mr. MAXWELL. At the last meeting of this committee particular attention was given to the fact that there are many places where the reclamation of arid land will be involved more or less with the control of water now used in part for irrigation. Undue emphasis was, in my opinion, placed upon this matter, as it is not an insuperable objection, nor one which can not be removed by the application of a few broad principles. This may well be laid aside in favor of simpler and commoner cases, where the Government, as the owner of the arid lands, can reclaim vast areas without complicity with established rights. It is better to take up these simpler cases first and to leave the doubtful matters for solution. In other words the bill under discussion does not purport to deal with the intricacies brought up, but rather to apply to the great need of the general reclamation of the West. If we diverge from this central idea to discuss special cases we shall soon become involved in endless side issues.

There are locations where the Government can build these irrigation works, and where they will be remunerative and profitable as a business proposition to the Government, although, of course, there are

other reasons why the Government would be benefited, even though it made no direct profit.

Referring, for example, to the item in the Indian appropriation bill for the San Carlos dam in Arizona, the area of public lands reclaimable is 100,000 acres, the exact capacity of the reservoir being 241,000 acre-feet, and the public land irrigable therefrom would have a value of \$5,034,900. Thus, if the Government went into this for a profit, it would produce a value of more than twice the amount of the investment.

Mr. NEWLANDS. Does the estimate cover the cost of all the diverting ditches that are necessary to reclaim the land or simply a reservoir?

Mr. MAXWELL. It covers the main canal also. The entire cost of the project, as I recall it, is something inside of \$2,000,000. The cost of the reservoir, I think, is estimated at \$1,030,000, but I have made a liberal estimate. The point is that if the Government wanted to go into it as a profitable enterprise it could make a profit; but, in my judgment, the Government does not want to do that. What the Government wants to do is to create homes on the public domain, and if it gets this money back, that is all it needs. The remarkable results that would be recorded in the West can be illustrated by additional facts with reference to the reasons which are applicable to all the other arid States and Territories.

In my discussion I have followed an entirely different line from that suggested by Mr. Mead. The difficulties with Mr. Mead's conception of the subject, in my judgment, are that he illustrates his remarks by conditions where complications exist which would prevent the satisfactory operation of this bill; but we must bear in mind that there are estimated to be in the neighborhood of 100,000,000 acres of lands in the West which are capable of reclamation—Government lands; that those lands are scattered throughout a multitude of localities, each locality having certain specific local conditions, and you can find locality after locality, you can find land enough in the West which the Government could reclaim under the Newlands bill to keep the Government at work ten years with all the money that would come in under that bill without running counter to one single objection Mr. Mead has raised. Take the results of this policy. There are, I apprehend, in Arizona at least, 5,000,000 acres of land which could be reclaimed. I take that as a round sum for illustration. I have heard it estimated as high as 12,000,000 acres. I have heard Hon. Binger Hermann, in an address at a banquet at Phoenix, Ariz., five years ago, I think, estimate the number of acres as 12,000,000. But take 5,000,000 acres, reclaiming it on the average cost per acre given, and dispose of it at \$20 an acre, and what have you done? You have created out of an absolute desert, which is worthless to-day, either to the State or the National Government, property worth \$100,000,000. Just think of it! That can be done in Arizona, a Territory where the Government owns the land and water and where there are no complications.

Mr. WILSON, of Idaho. And the Government also has entire control of legislation?

Mr. MAXWELL. Yes. What does that mean to the Territory? At 2 per cent on the hundred that would give Arizona an annual income which would support the Territory. The increase which will pile up when you begin to take into consideration the values created by the building of irrigation works in the West dazzles imagination.

The CHAIRMAN. Let me ask you one question right there, if you please. In estimating the amount of acres in Arizona at 5,000,000, do you mean that to embrace the total arid-land area or the land that could be fairly reclaimed?

Mr. MAXWELL. The irrigable land only, the land that is reclaimable. From the standpoint of the Territory of Arizona you have practically created a commonwealth. You have created a property there that will be a basis for State taxation, and so on for all time. You have created it out of nothing. The Government has got its money back. What else has the Government got?

At the last session of Congress this Government appropriated, I think, \$710,000,000, or something over that. Our population is something like 76,000,000. In other words, to make the illustration, if we do appropriate \$760,000,000, we would have appropriated and expended \$10,000,000 for every 1,000,000 of population. And yet no man has felt the burden. Now, what does that mean? If it has put 5,000,000 acres of this land under cultivation in Arizona, it means a population at the very least of 1,000,000; but that is low, because there are sections in existence in Utah and California to-day where the average population on irrigated land is as many as 1 per acre. There is a saving to the Government of \$10,000,000 per year on the same basis of population. If the population in this case was simply doubled you could collect twice as much revenue, or you could collect half as much from each and have the same as now.

Mr. RAY. How do you figure out so much profit to the Government? A day or two ago I attended a meeting here, and one of the speakers adverted to the fact that corporations, at the most desirable points and where most feasible, had engaged in this work of building reservoirs and supplying water for irrigation, and had abandoned it. He stated that such reclamation work could not be carried on because it had proved so costly and unremunerative. Now, if the corporations can not do it, how can the Federal Government take the same land and carry on this work and be expected to get great returns from it?

Mr. MAXWELL. I would like to say, Mr. Ray, that in my discussion here I had not intended to convey the idea that the Government can carry out this general plan and make a profit on each and every project. The plan I have been discussing is based on the idea that the Government shall get its money back from each project, with the benefit to go to the public from the perpetual basis of taxation created. That is the benefit to the State, the creating of a population from which the Government can perpetually draw revenue. That is sufficient to warrant the Government in reclaiming this property and adding it to our domain. That the Federal Government can do that when corporations, or even the States, can not do it grows out of several reasons. The advocates of the theory of State cession were insistent in Congress for many years before the Carey Act. Finally the Carey Act was passed as a basis of compromise. The Carey Act permits each State to take 1,000,000 acres and reclaim it without cost, provided they subdivided it among homesteaders. Now, if the State had the money in the Treasury to reclaim that land under the Carey Act for the very lowest price which it could be done, if they could let a contract for spot cash payable whenever the work was done, I think that, provided the administration was wise and honest, the State could do it; but in the first place, the difficulty is that the administration of these matters in the States has not been satisfactory; it has fallen into the hands of incompetent men, to say the least; and more

than that, the States have not the money and can not raise it. Take the Territory of Arizona. It has no funds; it can not bond the Territory for this great work. If it could borrow the money it could not pay the interest, because the proceeds from the disposition of the land could not come in until the settler had gone on the land and produced a crop, and lived there a number of years. Yes, not only that; even in the States where they have the resources which would enable them to raise the money by direct taxation or by issuing State bonds and entering upon this work, they have refused to do it. In California the people have taken the ground that the Government should reclaim these lands, and they have declined to enter upon the project. In Wyoming and Montana, where they have attempted to reclaim lands under the Carey Act, they have not assumed the obligation of seeing it done successfully. They have turned it over to land speculators and allowed them to take the contract and take bonds for their pay secured on the lands. They can not sell those bonds for cash. The law theoretically contemplates that they shall sell the bonds and put the money into the State treasury and then let the contract; but they do not do it. I investigated this last summer and I found the law permitted a bonded debt of \$12 an acre upon that land. They were not able to sell the bonds. They contracted with men who undertook to dig the ditches at the highest price they could give them, which was \$12 an acre. The result is going to be in every such case, if they do reclaim the land the men who hold the bonds will foreclose and get the land. Governor J. K. Toole, of Montana, last month said that under the Carey Act there had been quite a number of enterprises started in Montana, but not one acre of land has ever been reclaimed.

In the last report of the Montana State commission having the matter in charge it is stated that if the bonds could be sold and cash obtained the lands could be reclaimed; but this could not be done, and, as a consequence, the whole matter has been declared a failure.

The so-called Carey Act is to be found in section 4 of the act of August 18, 1894, entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1895, and for other purposes" (28 Stat., 372-422), authorizing the Secretary of the Interior, with the approval of the President, to contract and agree to patent to the States of Washington, Oregon, California, Nevada, Idaho, Montana, Wyoming, Colorado, North Dakota, South Dakota, and Utah, or any other States, as provided in the act, in which may be found desert lands, not to exceed 1,000,000 acres of such lands to each State, under certain conditions.

The text of the act is as follows:

SEC. 4. That to aid the public-land States in the reclamation of the desert lands therein, and the settlement, cultivation, and sale thereof in small tracts to actual settlers, the Secretary of the Interior, with the approval of the President, be, and hereby is, authorized and empowered, upon proper application of the State, to contract and agree from time to time with each of the States in which there may be situated desert lands as defined by the act entitled "An act to provide for the sale of desert land in certain States and Territories," approved March third, eighteen hundred and seventy-seven, and the act amendatory thereof, approved March third, eighteen hundred and ninety-one, binding the United States to donate, grant, and patent to the State free of cost for survey or price such desert lands, not exceeding one million acres in each State, as the State may cause to be irrigated, reclaimed, occupied, and not less than twenty acres of each one-hundred-and-sixty-acre tract cultivated by actual settlers, within ten years next after the passage of this act, as thoroughly as is required of citizens who may enter under the said desert-land law.

Before the application of any State is allowed or any contract or agreement is executed or any segregation of any of the land from the public domain is ordered by the Secretary of the Interior, the State shall file a map of the said land proposed to be irrigated which shall exhibit a plan showing the mode of the contemplated irrigation and which plan shall be sufficient to thoroughly irrigate and reclaim said land and prepare it to raise ordinary agricultural crops and shall also show the source of the water to be used for irrigation and reclamation, and the Secretary of the Interior may make necessary regulations for the reservation of the lands applied for by the States to date from the date of the filing of the map and plan of irrigation, but such reservation shall be of no force whatever if such map and plan of irrigation shall not be approved. That any State contracting under this section is hereby authorized to make all necessary contracts to cause the said lands to be reclaimed and to induce their settlement and cultivation in accordance with and subject to the provisions of this section; but the State shall not be authorized to lease any of said lands or to use or dispose of the same in any way whatever, except to secure their reclamation, cultivation, and settlement.

As fast as any State may furnish satisfactory proof, according to such rules and regulations as may be prescribed by the Secretary of the Interior, that any of said lands are irrigated, reclaimed, and occupied by actual settlers, patents shall be issued to the State or its assigns for said lands so reclaimed and settled: *Provided*, That said States shall not sell or dispose of more than one hundred and sixty acres of said lands to any one person, and any surplus of money derived by any State from the sale of said lands in excess of the cost of their reclamation shall be held as a trust fund for and be applied to the reclamation of other desert lands in such State; that to enable the Secretary of the Interior to examine any of the lands that may be selected under the provisions of this section there is hereby appropriated, out of any moneys in the Treasury not otherwise appropriated, one thousand dollars.

In the act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1897, and for other purposes, approved June 11, 1896, there is, under the head of appropriation for "surveying public lands," the following provision:

That under any law heretofore or hereafter enacted by any State, providing for the reclamation of arid lands, in pursuance and acceptance of the terms of the grant made in section four of an act entitled "An act making appropriations for the sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and ninety-five," approved August eighteenth, eighteen hundred and ninety-four, a lien or liens is hereby authorized to be created by the State to which such lands are granted and by no other authority whatever, and when created shall be valid on and against the separate legal subdivisions of land reclaimed, for the actual cost and necessary expenses of reclamation and reasonable interest thereon from the date of reclamation until disposed of to actual settlers; and when an ample supply of water is actually furnished in a substantial ditch or canal, or by artesian wells or reservoirs, to reclaim a particular tract or tracts of such lands, then patents shall issue for the same to such State without regard to settlement or cultivation: *Provided*, That in no event, in no contingency, and under no circumstances shall the United States be in any manner directly or indirectly liable for any amount of any such lien or liability, in whole or in part.

A further modification has been made by an act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1902, and for other purposes (approved March 3, 1901), as follows:

SEC. 3. That section four of the act of August eighteenth, eighteen hundred and ninety-four, entitled "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and ninety-five, and for other purposes," is hereby amended so that the ten years' period within which any State shall cause the lands applied for under said act to be irrigated and reclaimed, as provided in said section as amended by the act of June eleventh, eighteen hundred and ninety-six, shall begin to run from the date of approval by the Secretary of the Interior of the State's application for the segregation of such lands; and if the State fails within said ten years to cause the whole or any part of the lands so segregated to be so irrigated and reclaimed, the Secretary of the Interior may, in his discretion, continue said segregation for a period of not exceeding five years, or may, in his discretion, restore such lands to the public domain.

The laws of Wyoming, Idaho, and Utah are somewhat similar, and provide that the State land boards are authorized to make contracts with private individuals or corporations for the main canals or other irrigation works, and also to fix the charge for perpetual water rights. This right goes with the land and can not be sold separately.

In Idaho and Wyoming the fixed rate for the purchase of the land from the State is 50 cents per acre. In Utah it is not to exceed \$1 per acre.

Under the Washington law a single commissioner is authorized, who shall have power to make contracts for canals, ditches, or other irrigation works, reclamation, settlement, and sale of lands. Contracts are to be approved by the governor and attorney-general of the State. Lands shall be sold with a perpetual water right at not less than \$5 nor more than \$50 per acre and a maintenance fee of not more than \$1.50 per acre annually. The person or persons or corporation whose bid shall be accepted shall own and must maintain all canals for a period of at least fifteen years from date of acceptance of completed works, and thereafter the same shall revert to the landowners. The successful bidder shall pay to the State for the privilege enjoyed in reclaiming the lands 75 cents per acre to defray expenses and reimburse the State for outlay.

In Montana the State, as before stated, has been unable to accomplish anything of note under the Carey Act, for the reason that the State has refused to make itself responsible in any way. The matter has been intrusted to the arid-land-grant commission, which has been vainly endeavoring to dispose of the bonds. The principal facts concerning this commission are as follows:

- (1) The State arid-land grant commission is composed of five members.
- (2) It is empowered to select lands and to make surveys of necessary water systems for their reclamation.
- (3) To enter into contracts for the construction of water systems and to cause the lands to be settled.
- (4) To issue thirty-year 6 per cent bonds to meet the cost of reclamation and settlement of lands, which bonds constitute a lien upon the land, water rights, **water system**, and appurtenances to a district belonging.
- (5) To issue thirty-year 6 per cent bonds to develop water-power plants and water supply for domestic use, for the redemption of which bonds a sinking fund is provided. These bonds constitute a lien upon the water system and appurtenances. All bonds can be foreclosed, as in the case of mortgages, for nonpayment of principal or interest.
- (6) To sell such bonds at par for cash and pay cash for construction, or to pay bonds in lieu of cash.
- (7) The commission exercises full and immediate control over all construction and requires suitable indemnity from the contractor in the form of a bond from some responsible surety company.
- (8) The commission retains 15 per cent of the entire cost of construction of water systems and settlement of lands until both are fully accomplished.
- (9) The commission operates and maintains perpetually the **water system**, charging the entire cost of such maintenance and operation equally against all acreage in the district.
- (10) The commission sells all land and water rights, collects all moneys and places them in the treasury of the State.
- (11) In the event interest is not paid when due, for want of funds, interest coupons may be registered in the office of the State treasurer, which registered coupons will draw interest at 6 per cent per annum.
- (12) In the event there is a surplus in the State treasury after providing for the redemption of coupons next due, the commission may require the State treasurer to invest such moneys in State, county, or school-district bonds, or it may cause such moneys to be placed in trust for the benefit of the bondholders.
- (13) The commission will provide for the payment of interest and principal in the manner as shown herewith in certificate of selection, terms of sale, and regulations.

Summing up the situation, the results are best shown in the accompanying table, which brings out plainly the fact that after six or seven years of effort less than 1,000,000 acres have been applied for by 5 out of the 11 States named in the act, and about one-fourth of the acreage contained in this list has been approved. Less than 8,000 acres have actually been patented or disposed of by the Government out of the possible total. In other words, an enormously expensive machinery has been created by law to dispose of these lands, and after years of effort and large expenditures incurred by the various States in legislation and in the maintenance of boards and surveys, less than 8,000 acres have actually been disposed of.

Status of selections under act of August 18, 1894.

Acreage applied for by each of the States:		Acres.
Idaho, 6 lists	.....	323,308.80
Montana, 5 lists	.....	91,015.00
Utah, 3 lists	.....	236,467.50
Washington, 4 lists	.....	85,456.26
Wyoming, 17 lists	.....	212,210.34
Total	.....	948,457.90
Acreage of lists approved (not patented):		
Idaho, 3 lists	.....	57,706.51
Montana, 5 lists	.....	91,015.00
Wyoming, 11 lists	.....	99,057.58
Total	.....	247,779.09
Acreage of lists patented:		
Wyoming, 3 lists	.....	7,640.91
Acreage of lists still pending:		
Idaho	.....	265,602.29
Montana	.....	None.
Utah	.....	236,467.50
Washington	.....	85,456.26
Wyoming	.....	82,960.59
Total	.....	670,486.64

All but a very small number of the pending lists are awaiting the action of the States.

MR. NEWLANDS. Is it not a fact that in many cases the lands to be reclaimed are in one State and the reservoir necessary for the storage of the water to reclaim the land is in another State, and thus an interstate question is involved?

MR. MAXWELL. Very frequently.

MR. RAY. How could the United States go to work and take lands and waters from one State and give them to another for the benefit of another?

MR. MAXWELL. I do not understand that it does so.

MR. NEWLANDS. The proposition is simply to store the flood waters.

MR. MAXWELL. I will illustrate by the case of the land between California and Nevada. The reservoirs which must be used to irrigate the lands of Nevada must be in California. California can receive no benefit from them.

MR. RAY. To whom do they belong?

MR. MAXWELL. The reservoir sites belong to the Government. They are in the Sierra Nevada Mountains.

Mr. NEWLANDS. But these waters all belong to the Government.

Mr. MAXWELL. In California the Government controls all the water connected with the public lands.

Mr. RAY. That raises a different proposition, providing those waters you seek do belong to the General Government. If they belong to the General Government, and it is desirable to use them, for instance by the State of Nevada, for irrigation purposes, then the United States Government would be at perfect liberty to give Nevada either absolute fee and title to the water or to give them the right to use the water; so that in California there is no interstate question at all, because California has no right there whatever.

Mr. MAXWELL. But California has certain rights. As I understand the first question, it was how the Federal Government could take water from one State to irrigate in another State. I was illustrating that by the conditions between the States of California and Nevada.

Mr. RAY. The proposition of Mr. Newlands was that interstate questions were raised here, because of the fact that these waters were in California, and Nevada needs them to irrigate its lands. Now, if that is true, then the United States Government could not interfere and could not avail itself of the water. If it is not true, then there is no interstate question at all; it is simply a question between Nevada and the United States.

Mr. BARHAM. There are a whole lot of lakes there we can take for illustration. We will not take Lake Tahoe, because that would involve other interstate questions; but take these others. They are owned by the Government of the United States. Now, we want to put a dam at the outlet of one of those lakes. It does not affect any private interest at all in California to take water and hold it there to be run out into Nevada for irrigation purposes. But you could not take Lake Tahoe, because that is owned by private ownership on our side, while on the Nevada side I think you have cut off the timber.

Mr. NEWLANDS. Just let me explain the topography there. The Sierra Nevada Mountains divide California from Nevada. As you go along the summit of the mountain there is a slope toward California and a slope toward Nevada. The places where we propose to establish reservoirs are in California; the lands to be reclaimed are in Nevada. All the plains, recollect, are in Nevada; the California side is all mountainous, and all those reservoir sites are in California. These rivers are not navigable, and it is proposed to store the flood waters, which otherwise flow into the sinks of the desert, where they can not be utilized. The interstate question I suggest is this: That it would be difficult for the State of Nevada to enter upon an enterprise of constructing reservoirs in the State of California. Assuming that the National Government grants to Nevada the ownership of all the public lands on that slope in California, why, then, this difficulty presents itself. Nevada is making an investment upon California soil. As soon as that property is transferred from the United States to Nevada it becomes property subject to taxation; as long as it is in the ownership of the Federal Government it escapes taxation. Now, my judgment is that complications will arise, and reservoirs located in California, but belonging to Nevada, would simply be taxed out of existence.

Mr. RAY. One of two things is true: Either the waters and lands that it is desirable to utilize for irrigation purposes in the State of Nevada belong to and are under control of the United States, or they belong to and are under the control of the State of California. If

they belong to and are under the control of the State of California, then the Government of the United States could not interfere and could not avail itself of it. If, on the other hand, they are under the control and belong to the United States, then the United States can grant every right it has to the State of Nevada—

Mr. NEWLANDS. Except exemption from taxation.

Mr. RAY. And would not have to pay a single penny by way of taxation or otherwise to California, because California can not tax that land if it belongs to the United States.

Mr. WILSON, of Idaho. But the moment it grants it to Nevada it can.

Mr. MAXWELL. I think the Supreme Court of the United States has answered Mr. Ray's question. In fact, the legal situation is this: The Government has all the right with reference to the water relative to the public land that any riparian owner has, without regard to State laws.

Mr. RAY. You are referring to navigable waters.

Mr. MAXWELL. No; to running streams. This is the decision of the Supreme Court in 174 United States Reports. In the absence of specific authority from Congress a State can not, by legislation, destroy the right of the United States, as the owner of lands bordering on a stream, to the continuous flow of its water, so far at least as may be necessary for the beneficial uses of the Government property. In other words, the right of the riparian owner attaches to all lands owned by the Government, in the hands of the Government, without regard to State lines.

Mr. RAY. That is perfectly true, but it does not need any decision of the United States Supreme Court to decide that; everybody knows that; that is a right of a riparian owner. Now then comes the other question, even if that be true, if the United States Government does own that, it is simply a holding, the Government would have no right whatever, not the slightest right, to divert a single pint of that water into the State of Nevada for the purpose of irrigation in the State of Nevada. It is simply an instance of the right of the adjacent owner, and the fact that the United States owns land in California bordering on this stream does not give it any right whatever to take the water in that stream and carry it into Nevada to irrigate lands in Nevada or any other place.

Mr. KING. In the arid region, either by judicial decisions or common law, the riparian right has been abrogated, and we do not recognize the doctrine of riparian proprietorship, and you may have a stream flowing before your door and if you do not appropriate it I can go above and appropriate every drop of it.

Mr. RAY. Then, if that is your law, it is in contradiction to the Supreme Court of the United States. That can not be true; it is impossible for that to be true, because if the United States owns land bordering on a stream, and this decision is good for anything, then the United States Government has the absolute right to have that water continue to run by the side of that land, and it is entirely immaterial whether they appropriate it or not. There is that decision. Now, the fact that the State has a different law as to itself and its owners of land does not interfere at all with the rights of the United States Government.

Mr. KING. I do not know the decision, but in 1866 Congress enacted that the local laws and customs of the States and Territories with respect to the use of water should be recognized by the United States

Government, and the decisions of the Federal courts have recognized those local laws and customs.

Mr. RAY. It must commend itself to your common sense that if I own a farm upon a stream in any State of this Union—and I do not believe there is a State that has a law to the contrary—and the water of that stream runs through my farm, it is entirely immaterial whether I use it for milling purposes or any other purpose, to hold that you, owning land above me, 2 miles above, may divert all that water and carry it off in another direction and leave my farm without water for my cattle to drink, or for me to dip up for any other farming purpose, would be contrary to the primary rights of man.

Mr. KING. That is precisely what I mean to assert; that what you state is not the law.

Mr. RAY. Then you could leave a farm absolutely dry?

Mr. KING. Yes; if the farmer does not use the water.

Mr. RAY. Simply because he does not divert the water, even though it is that water that gives his farm value? Tell me a State where that law prevails.

Mr. MAXWELL. The case of the Livestock Company v. Booth, in California decides that point—that the riparian owner has no more right than any other owner. He has the right of use, but he has no right to water that he is not using.

Mr. RAY. That is just the point I made. If that water runs through your farm and percolates into your soil, your cattle drink from that water, and you are using it for your ordinary farming purposes: you go down with your bucket, dip up a pail of that water, and it percolates into your soil and it waters your farm. Now, then, the idea that a farmer above can divert all that water for some use of his own is contrary to the primary rights of humanity, and I never heard of such a proposition before.

Mr. NEWLANDS. The riparian doctrine belongs to the wet region, and this doctrine asserted by Mr. King belongs to the arid region, and you will find that beneficial use is the basis and measure of the right to water.

Mr. RAY. Do you state, Mr. Newlands, that that is a law in the State of Nevada?

Mr. NEWLANDS. The arid region; yes, sir.

The CHAIRMAN. If the man above happens to get title before the man below he can appropriate the water, and then when the man below gets the right to appropriate it it is already gone. Is that true?

Mr. KING. No; my proposition is this: You may have a stream running through your ground, and if you do not use it I may go upon the stream above you forty years later and appropriate all that water if you have not subjected it to a beneficial use; then I can appropriate that much of the water which you have not so used.

Mr. BARHAM. If you go up above you can only use that which the man below has not been using. The very proposition that Mr. Ray makes is that the man below has used it. Now, then, you do not mean to controvert that proposition at all, because if the man below is using it for irrigation or drinking by his cattle, or for any other purpose, of course you could not run that stream off, divert that stream under any law on earth. You did not mean to say that.

Mr. KING. Oh, no.

The CHAIRMAN. Suppose a dairyman was located on a stream and had 10 cows, and he was appropriating water enough to water his 10 cows. Do I understand that a man can go upon that stream above

him and appropriate all the water except that which he has been using for his 10 cows; and then, when the dairyman gets ready to enlarge his dairy, and needs more water, that he has no right to use any more?

Mr. KING. That is exactly right. And in some States they do not recognize the right to use water for drinking purposes to be superior to the right to use it for agriculture.

Mr. RAY. If the Government owns a million acres of land through which runs a fresh-water stream, and it is the only stream running through it, and the Government deeds to me a thousand acres just above the million acres it owns, do you mean to say that I have a perfect right to divert that river and carry it away from the million acres owned by the Government, and that thereafter, when the Government sells that land, the purchasers must go without water?

Mr. KING. That is it.

Mr. BARHAM. I think, as far as the illustration you gave just now is concerned, that in the arid-land region the decision would be just what Mr. King claims, because for the same reason the Government has not appropriated that water; it has not used it; it has not begun to use it. If there were people below there who had used it, then you could not divert the water.

Mr. RAY. Do you think, if they sold to me 10 acres of land above the million acres through which the river runs, that I thereby can become the exclusive owner of the right to use all that water?

Mr. BARHAM. Not unless you put it to beneficial use on your land. The Government has not used the water at all, and it knows when it deeds you the thousand acres of land, or whatever it is, that you can not use that land unless you have a right to divert that water. But the proposition you started out with is elementary, and I admit the law.

Mr. RAY. You have a right to divert that water as it flows through your land for the ordinary uses of that land, if you do not unnecessarily detain it, but when it passes on you must restore it to the original stream for the beneficial use of the owners below.

Mr. WILSON, of Idaho. That is not the law in the arid region.

Mr. BARHAM. There is no doubt that you are right about the elementary principle of common law.

Mr. NEWLANDS. Yes, that is common law, but not the law of the arid region.

Mr. BARHAM (continuing). But you forget this: The use of that water is for irrigation, and you own the thousand acres of land, and you have the right to take all the water which is a profitable use of the water, all that is necessary for the irrigation of the thousand acres, and turn back the balance.

Mr. RAY. You must restore it, must you not, to the original stream?

Mr. BARHAM. Yes; there is no doubt about that.

Mr. RAY. In other words, you can turn it out into channels on your own land, but those channels must come back.

Mr. WILSON. Sometimes it is carried away for distances of over 50 miles.

Mr. KING. You never restore it at all and you do not have to do so under the law in the West. In this contrast Pomeroy on Riparian Rights and Mr. Gould and you will see the difference between the common law and the law of the arid-land regions.

The CHAIRMAN. Take another view—a situation which is expected to arise very frequently. Suppose a homestead settler in your State, or in Utah, should start to go into the fruit business, and he begins

in a small way and finally succeeds in getting an orchard of 5 acres. It is all his means will permit. Now, while he gets his orchard of 5 acres and turns the water on it, I understand that the riparian owners above can use all the water except the amount he needs for his 5 acres, and when he gets ready to make an addition to his orchard, to cultivate 10 acres, he can not get the water for it. I think that is a fair illustration, just like the illustration of the dairyman.

MR. WILSON, of Idaho. The State legislature has provided how water shall be appropriated, and there are various steps to it in different States. In our State, for instance, you will file a regulation notice for so many cubic feet per second, enough to irrigate your land. You commence to divert that water, and you are given a reasonable time to divert it, and what that reasonable time is of course differs with each case. But you must pursue it with reasonable diligence, and of course you must reclaim your land with reasonable diligence.

MR. KING. Mr. Chairman, if you should go there and start your garden of 5 acres and construct a ditch only large enough to irrigate 5 acres, and it was found from your outward conduct that that was all you intended to appropriate, then I could go above you a year afterwards, or a day afterwards, and take all the balance of the stream for my use.

THE CHAIRMAN. However, if I started a garden or an orchard, I would be allowed what water I needed, and notice would be taken of my intentions and conduct in the way of enlarging my production.

MR. WILSON, of Idaho. We do not have to restore it to the stream. Sometimes we divert water for 50 miles and pass hundreds of homesteads. The theory of returning to the stream is entirely abandoned, *ex necessitate re*, on account of the conditions which exist. That idea of returning the water to the stream has been done away with, that right has been abrogated, and the circuit court of appeals of San Francisco has affirmed the law we had in that respect. I tried the case in which that was decided, and am familiar with it.

THE CHAIRMAN. Another question. Under these State laws can the owners appropriate all water, so that subsequent homestead settlers upon public land that is now unoccupied will have no right to the water?

MR. WILSON, of Idaho. Absolutely. It is done over the whole arid region.

THE CHAIRMAN. Is not that a serious matter to consider when the Government undertakes to construct these reservoirs? Is there not danger in constructing these reservoirs to store water that may be used by owners before it gets there?

MR. WILSON, of Idaho. I do not think that there is any difficulty about that. People go there to farm, say, 50,000 acres of land, and they find there is only sufficient water to irrigate 10,000 acres, and they find that this 10,000 acres is where the water comes out of the canyon, and so they locate there. You can see what the result would be if you did not permit such a law as that—if you did not permit the first man upon the stream to use the water.

MR. BARHAM. Take an illustration that frequently occurs in California. Here are ditches filled with water, and the water is appropriated, all the water—all the water that can be conserved in the mountains by any bill that has been introduced here. Now, if we build a dam up here in the mountains to conserve the flood waters, how are you going to prevent the possibility of simply feeding the ditches and the appropriation of water that has already been made?

MR. KING. The Government before it builds a dam for conservation

purposes must ascertain the maximum appropriation of all the proprietors, by common measurement, and then it can not have anything until those people have that maximum flow. All above that would be the Government's, because it then would be the proprietor.

Mr. BARHAM. How can you make that out?

Mr. KING. You have to make the measurements.

Mr. BARHAM. I don't mean that; that is easy. But how can you make out, if the Government constructs a reservoir here and catches the flood water, how can you make out that they will not be required to let those flood waters into the stream?

Mr. KING. They have got them, then, by being the proprietor. Our laws recognize an appropriation in July, an appropriation in August, and an appropriation in May upon the same stream. Many men have rights to water in May and do not have any rights to the water in July.

Mr. BARHAM. But you have to divert the water where the ditches are all ready to divert it.

Mr. RAY. If the theory advanced is true, you advance an argument that would knock this whole scheme in the head at once. This inkstand, we will say, is a reservoir of water; all the water available is turned into the reservoir. Here are millions of acres of land immediately below that that the Government purposes to irrigate and purposes to sell for homesteads; they get around the water in here and open up their ditches; they sell to a few men up here [indicating] 10,000 acres, and then they sell to these people down here, and they commence irrigation and it uses up all the water to irrigate these little farms up here, covering a tenth of it, or may be a quarter of it. The rest of it goes dry. These men have no benefit whatever; or, if you undertake the whole, then it is not sufficient to irrigate the whole and you render the whole worthless and your whole scheme goes wrong.

Mr. REEDER. When they build that reservoir they know what they can irrigate and they irrigate every foot they propose to and no more.

Mr. KING. I can give you an illustration of a stream that irrigates 2,000 acres of ground in June and July and about 3,000 acres in May and April. If we had a rough land there close by we could irrigate 7,000 or 8,000 acres in April and May; and if we could store that water and let it come down later, instead of only having enough for 2,000 acres later in the season we could irrigate 5,000 or 6,000 acres. The Government knows now that the maximum appropriation of water upon that stream is 3,000 acres in high water and 2,000 acres in low water. It knows it has the right by husbanding the water to have all the surplus which it husbands; therefore it has got to figure upon giving to those people there 3,000 acres in spring and enough for 2,000 in August; but all the balance it can have and do what it pleases with, and by building a reservoir it can store enough to have 5,000 in July.

Mr. RAY. Who is to have the first right to water out of these reservoirs on these public lands?

Mr. KING. Whoever the Government determines. If the Government builds a reservoir it can determine who shall be the beneficiaries, who shall be the beneficial users and have the usufruct.

The CHAIRMAN. The Government would be the proprietor under your law?

Mr. KING. Yes.

The CHAIRMAN. You would not have to carry it on the land?

Mr. KING. But I think if the Government manifested no disposition

to sell it or lease it, it would be appropriated, and the first ones would have it.

Mr. REEDER. And some of these big companies could appropriate that water and thus make it profitable to them, immensely so, but we are trying to provide that no man can appropriate over 80 acres.

Mr. KING. Yet the law recognizes a reasonable time for the man to get the water and convert it to his use—to get the land and appropriate the water.

Mr. RAY. Does not this land that you propose to irrigate take up water very rapidly?

Mr. KING. Yes, some of it does; some is clay soil.

Mr. WILSON. Generally speaking, it does.

Mr. RAY. In most localities there is not much limit to the amount it will take up?

Mr. KING. That is it, but little by little the requisitions by the land for water are less and less. I know some land that once had to be irrigated to-day has to be drained.

Mr. RAY. And those lands up there would absorb a great deal more water than they needed?

Mr. KING. No, the law forbids the application of more than is being used, and if it was being wasted it would not be regarded as a beneficial use and the owner would be enjoined.

Mr. REEDER. Another thing. They measure that water as certainly as you can measure oats you feed your horse.

Mr. KING. They estimate that so many inches of water running a certain length of time will irrigate a certain amount of land, and above that it is waste, and the courts now are holding the irrigators down to the scientific testimony as to the use of water upon the land. The last case I tried involving that question brought out testimony to show what the use of the water was. Those men said that they should have so much water and then experts went on the stand and said "one-half of that is sufficient," and cut the farmers down one-half.

Mr. MAXWELL. It seems to me this discussion illustrates very much more strongly than any argument I can make that if you undertake to imagine difficulties you can imagine more in a day than can be explained in a thousand years; and we will never get the problem solved, because there will always be some new difficulty suggested. If you will take it up by localities and go on the ground and find the actual place, rather than imagine it, you can find more places where this law can be put in force and the land be reclaimed than you can accomplish in the way of reclamation, by this other theory, in ten years. I earnestly urge that this be made the keynote of this discussion.

Take the one point brought here—the rights of the riparian owner. This whole question was brought up and decided in the Lux case in California. That case occupied many months and cost hundreds of thousands of dollars before it was settled. They decided that while the law recognized riparian rights existing in California, they whittled it away, and it only exists as a fiction because the Supreme Court has lately decided that the limit of the riparian owner's rights is the limit of his beneficial use.

I have told you what you could do in Arizona—that you could take land there which is now a desert and make it worth millions of dollars, and that the Government could get the money back as fast as they can reclaim the land.

Take it over in California. Judge Barham referred to a place yes—

terday where there is not a drop of water used to-day—a place that is simply a natural reservoir. You can take the water there out of a tunnel and turn it into a valley—the Honey Lake Valley—simply take it out of the mouth of your tunnel into a narrow mountain stream. There are no complications to be met with there at all. That is Government land, and you dig your canal out there and there are no intervening rights, no complications; you decide how much land you will irrigate, and you simply put the water on it. There are many such cases. If we can not commence with the easy places we will never get through all the complications that have been suggested among the reasons why the States and private capital have not succeeded. The question was asked yesterday, “Why can not private capital do this?” For two reasons; first, because the majority of cases will not be a profit to the investor as such, and private capital seeks a profit. In an irrigation scheme there is first a promoter’s profit, then an investor’s profit, then a bond-buyer’s profit, then the interest charges; and before they have the first settler on the land the price of the land is so high they can not pay it, and they go into bankruptcy. That has been the experience of one case after another. Another reason. The law of the arid region to-day is—and in the State of California, if you go there to-day, they will tell you that is the chief reason why private capital will not build irrigation works, that no law on earth will lead the people of California to forsake that constitutional provision. They would rather that no money would come there and be invested than to put the chain around their necks that the water company owns the water. They would rather that no more works be built, and they will say to those companies, “Keep your money; we do not want your investment,” rather than give up their constitutional right.

That is the condition, those are the reasons. You can go into any State and the Government can come in and build these works and take the water out in main line canals, so that the settlers can do what the early settlers did in Utah, what they did in California in the San Joaquin Valley, what they did in Idaho—dig their own ditches and put the water on the land and raise crops and get rich; and it was when that reached its limit, when that could not be done any more, that they began to get into trouble, and it began to be developed that private capital could not control these works and do what the Government has to do.

What is it that we ask the Government to do? Nothing more than what nature did for the early settlers. Store the flood waters, take the waters that can not be taken from these great canyons and rivers by private capital out upon the prairie by the main-line ditches, so that the people can go there and put their plows in the ground. That is it.

One advocate says the Government should carry water to the point where private enterprise can handle the water. What private enterprise? The land speculator or the settler? I say the settler. I say that it is the duty of this Government that it owes its people to-day to put that great domain in shape so that men who have knowledge and industry and strong right arms, such as the earlier settlers had, can go there and build their own ditches, and that is what they will do when the Government builds these reservoirs.

But what would be the case in Wyoming to-day if the Government should build these reservoirs? There is comparatively little land in Wyoming or any other State where, if the State builds nothing but a

reservoir, the settler can get a drop of it. The speculator would get in and by some proposition build a great canal and take a profit out of the farm—tax the farmers for that to such an extent that it will take them a generation to earn that. What the Government should do is to bring the water to a point where the farmers can build their own canals and use it throughout their farms and homes.

In conclusion, I wish to call attention to an extract from a report by Hon. Charles D. Walcott, of the United States Geological Survey, relating to the bill introduced by Mr. Newlands (H. R. 14988). This brings out clearly some of the reasons why, in the opinion of an officer of the executive branch of the Government, such a bill would be of immediate advantage.

EXTRACT FROM REPORT BY HON. CHARLES D. WALCOTT, DIRECTOR
UNITED STATES GEOLOGICAL SURVEY.

The bill provides for the beginning of reclamation by the use of funds derived from the country in which the works are to be built. It also sets a limit to the expenditure and permits the steady growth by the refunding of expenditures and continual addition, making possible a systematic and economical development. Even though the amount available for construction should at first be small, it is apparent that the ultimate outgrowth will be large and that the reclaimed lands will be offered to the public so gradually that there will be no disturbance of industrial conditions.

There has been in the past an apprehension that the reclamation of the arid public domain would bring the agricultural lands of the West into competition with those of the East. This fear has been due to ignorance of the fact that the products from irrigated lands are essentially different from those from humid lands, and do not reach the same market; but even if there should be competition along a few lines, this will not be injurious, if brought about by slow, systematic development contemplated through the arid-land reclamation fund.

Attention is called to the fact that the bill under consideration does not provide for maintenance and final disposal of the works. It may be wise at the present time not to attempt to solve this class of problems, as it will probably be several years after such a bill is passed before they will arise. In the meantime, experience will have been acquired, so that the Secretary of the Interior can make definite recommendations growing out of thorough consideration of the problems.

The investigations which have been carried on by the United States Geological Survey, extending over a period of thirteen years, have been mainly in the line of ascertaining the facts as to the possibilities of reclamation, such as the flow of streams and location of reservoir sites. As the outgrowth of this long-continued study, it seems desirable that some plan, such as that proposed by the bill under discussion, be followed to bring about gradual reclamation of lands susceptible of reclamation, but which can not be utilized if dependence is placed upon private or corporate enterprise. There are many localities where work of this kind may be undertaken as the need and opportunity arises.

While there are many places where the Government can reclaim public land, there are also other localities where the water supply must be regulated in order to render possible the full development of the land now in whole or in part in private ownership. Where such conditions exist, it is apparent that such a bill does not apply. On long

rivers, like the Platte and Arkansas, whose waters even in time of ordinary flood have been appropriated, there is no probability that return can be made to the reclamation fund, and a different treatment must be accorded.

There is still another class of conditions where the Government is a considerable landowner, the public lands being interspersed with areas in private possession. Here it often occurs that the water rights are exceedingly complicated, and, as pointed out by the experts who have been studying the laws and institutions of irrigated countries, there is necessity for mutual adjustment and understanding before the irrigable area can be increased through water storage. The possibility of building storage works would act as the strongest conceivable inducement for these people to unite to secure equitable distribution of the water under existing laws, thus enabling the Interior Department to know definitely what claims exist prior to those which may be acquired from the water stored in the reservoir.

The object to be attained by legislation proposed by these bills is evidently that of bringing within reach of new settlers upon the public domain a permanent water supply, such as that found by the pioneers. They had merely to take out canals and diverting ditches and thus enjoy a priority of supply now guaranteed by custom and law. These opportunities have been utilized, and the later comers find themselves confronted with a task enormously greater than that of their predecessors and far beyond their means. It is possible to bring about, through storage and water conservation, conditions resembling those encountered by the first settlers and make possible a steady influx of population, who by united effort can take the waters artificially regulated and carry them to their lands. In other words, the operations of these proposed bills create conditions which will give to the settlers on these arid lands a sufficient water supply on easy terms, thus enabling them to make homes and with their own labor and teams build the distributing canals and laterals necessary to bring the water to the land.

The advantage of bills of the character proposed is that it enables a development of the country without disturbing the existing status or awakening justifiable uneasiness as to future conditions. There has grown up in irrigated countries a fear that the existing priorities of water rights may be disturbed by the building of new and larger systems of irrigation. If the Government, in pursuance of a policy to promote the increase of homes on the public lands, proposes to build reservoirs, every reasonable assurance should be given the people already settled that they have nothing to fear, but, on the other hand, that their vested rights and existing customs will be guarded and not disturbed by the bringing under irrigation of additional areas of fertile but arid land.

It has often been pointed out that increase of irrigated areas and extension of irrigation upon the public lands is now to a certain extent prevented by local jealousies and defective methods of distribution of the water, and that a larger prosperity would be enjoyed if by any means the farmers along a stream could be induced to adjust their differences under some system of local control, such as that which exists in a few of the arid-land States. There could be no stronger inducement held out to the States and to the irrigators to perfect the local control than the understanding that water conservation would begin only when such efficient local control had been provided.

The proposed bills do not provide for the charging of interest nor for the hasty pushing forward of the works to completion in order to bring about an early return, such as is essential to the success of corporate enterprise. In such matters private capital is concerned with obtaining the largest return for the smallest expenditure, while the spirit of the bills under consideration is evidently to bring about the largest development and the greatest good to the greatest number consistent with an economical expenditure. As a result it appears from the examinations already made that where private capital would find it expedient to reclaim, say, a thousand acres from a given source in order to make the largest return, the Government works, built with a view to the best development of the country, might reclaim ultimately two or three times as much.

From the very moment that private capital is raised and surveys are begun up to the time that the works are completed the interest charges accrue and must be met out of the proceeds of the enterprise. So that if several years are spent in preliminary work and in final construction the accrued interest may add from 10 to 50 per cent to the total cost. Such charges, it is assumed, are not contemplated against the reclamation fund, and thus, although the works built by this fund may be more elaborate and permanent than those built by corporations, yet from these considerations it is apparent that in the long run they need not be more expensive. From this consideration it appears, as before noted, that thousands, or even millions, of acres can be reclaimed under laws of this character where corporate enterprise would not enter, or at most undertake the work in a small way, reclaiming only a portion of the total area.

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